

# Acoustics, Vibration, and Phononics

## MONDAY, NOVEMBER, 12

### 1-1 PHONONIC CRYSTALS AND METAMATERIALS

#### 1-1-1 Nonlinear Phononics

Third Floor, David L. Lawrence Convention Center,  
Room 301 9:45am - 11:30am

Session Chair: **Mahmoud Hussein**, *University of Colorado Boulder, Boulder, CO, United States*

Session Co-Chair: **Liang-Wu Cai**, *Kansas State University, Manhattan, KS, United States*

**9:45am Nonlinear Wave Propagation In Reconfigurable 2D Multistable Lattices With Bistable Springs**  
Technical Presentation. IMECE2018-89741

**Julien Meaud**, *Georgia Institute of Technology, Atlanta, GA, United States*

**10:06am Switchable Phononics via Instabilities in Soft Composites**

Technical Presentation. IMECE2018-88467

**Stephan Rudykh**, *Technion - Israel Institute of Technology, Haifa, Israel*

**10:27am Inter-modal energy tunneling with subwavelength characteristics in nonlinear waveguides**  
Technical Presentation. IMECE2018-87877

**Weijian Jiao**, *Department of Civil, Environmental, and Geotechnical Engineering, University of Minnesota, Minneapolis, MN, United States*, **Stefano Gonella**, *Department of Civil, Environmental, and Geotechnical Engineering, University of Minnesota, Minneapolis, MN, United States*

**10:48am Conversion of Compressive Impact to Tensile Stress Waves via Origami-based Mechanical Metamaterials**

Technical Presentation. IMECE2018-87767

**Hiromi Yasuda**, **Yasuhiro Miyazawa**, **Jinkyu Yang**, *University of Washington, Seattle, WA, United States*

### 1-2 GENERAL NOISE AND VIBRATION CONTROL

#### 1-2-1 General Noise and Vibration Control

Third Floor, David L. Lawrence Convention Center,  
Room 302 9:45am - 11:30am

Session Chair: **Albert Kirwan**, *Electric Boat, Groton, CT, United States*

Session Co-Chair: **Brent Paul**, *Alion Science and Technology, Harrisburg, PA, United States*

**9:45am Numerical Investigation on Effects of Structure Parameters on Acceleration Noise of Involute Spur Gear System Under Different Operation Conditions**

Technical Paper Publication. IMECE2018-86955

**Changyin Wei**, **Jingang Wang**, **Hai Liu**, **Yong Chen**, *Hebei University of Technology, Tianjin, Tianjin, China*, **Hanzhengnan Yu**, *China Automotive Technology & Research Center, Tianjin, China*, **Kunqi Ma**, *Hebei University of Technology, Tianjin, China*

**10:06am An Improved Optimal Adaptive Control Method for MIMO Sine Vibration Control of a Multichannel Coupled System**

Technical Paper Publication. IMECE2018-86983

**Li Chao**, **Zhangwei Chen**, *Zhejiang University, Hangzhou, China*, **ZU Hongfei**, *University of Pittsburgh, Pittsburgh, PA, United States*, **ZHAO Yugang**, *Econ Technologies Co., Ltd, Hangzhou, China*

**10:27am Experimental Investigation on the Vibration and Noise Characteristics of the Vibration Damping Alloy Material**

Technical Paper Publication. IMECE2018-87189

**Xiang Ji**, **Yong Chen**, **Hai Liu**, *Hebei University of Technology, Tianjin, China*, **Hanzhengnan Yu**, *China Automotive Technology & Research Center, Tianjin, China*, **Changyin Wei**, **Zhibiao Yan**, *Hebei University of Technology, Tianjin, Tianjin, China*

**10:48am Different Definitions of Entropy for Statistical Energy Analysis**

Technical Paper Publication. IMECE2018-87240

**Zahra Sotoudeh**, *Cal Poly Pomona, Ontario, CA, United States*

**11:15am Subjective Evaluation of FCV Interior Sound Quality During Acceleration**

Technical Paper Publication. IMECE2018-87011

**Hai Liu**, *Hebei University of Technology, Tianjin, China*, **Yanyi Zhang**, **Dong Hao**, *China Automotive Technology and Research Center, Tianjin, China*, **Yong Chen**, **Xiang Ji**, **Changyin Wei**, *Hebei University of Technology, Tianjin, China*

### 1-8 VIBRATION AND ACOUSTIC MEASUREMENTS, SIGNAL PROCESSING, AND TEST FACILITIES

#### 1-8-1 Vibration and Acoustic Measurements, Signal Processing, and Test Facilities I

Fourth Floor, David L. Lawrence Convention Center,  
Room 403 9:45am - 11:30am

Session Chair: **Kristin Cody**, *Naval Nuclear Laboratory, Jefferson Hts, PA, United States*

Session Co-Chair: **Zhongquan Charlie Zheng**, *University of Kansas, Lawrence, KS, United States*

**9:45am Analyzing interrelationships between structural damping and vibro-acoustic performances of elastic materials**

Technical Presentation. IMECE2018-88778

**Antonio Figueroa**, **Mike Telenko**, *Shiloh Industries, Plymouth, MI, United States*, **Sean Wu**, *Wayne State Univ, Detroit, MI, United States*, **Lingguang Chen**, *Wayne State University, Detroit, MI, United States*

**10:06am Parametric Study of Helmholtz Resonator Performance and Effect of Poroacoustic Material Use in Resonator Design**

Technical Presentation. IMECE2018-88750

*Yasaman Esfandiari, Atul Kelkar, Shan Hu, Iowa State University, Ames, IA, United States*

**10:27am On the Free Vibration Analysis of a Sandwich Beam With Tip Mass**

Technical Paper Publication. IMECE2018-87535

*Eshagh Farzaneh Joubaneh, Oumar Rafiou Barry, Central Michigan University, Mount Pleasant, MI, United States*

**10:48am A Comprehensive Tool for Locating and Analyzing Sound Sources**

Technical Presentation. IMECE2018-88800

*Yazhong Lu, Wayne State Univ, Detroit, MI, United States, Ling-guang Chen, Wayne State University, Detroit, MI, United States*

## 1-1 PHONONIC CRYSTALS AND METAMATERIALS

### 1-1-2 Micro and Nano Phononics

**Third Floor, David L. Lawrence Convention Center, Room 301 1:45pm - 3:30pm**

Session Chair: **Ankit Srivastava**, *Illinois Institute of Technology, Chicago, IL, United States*

**1:45pm Soft Opals beyond Hypersonic Phononics**

Technical Presentation. IMECE2018-88712

*Yu Cang, Zuyuan wang, Max Planck Institute for Polymer research, Mainz, mainz, Germany, Przemyslaw Marjaszewski, Micheal R Bockstaller, Carnegie-Mellon University, Pittsburgh, PA, United States, George Fytas, Max Planck Institute for Polymer research, Mainz, mainz, Germany*

**2:06pm Direct Observation of Polymer Surface Mobility via Nanoparticle Vibrations**

Technical Presentation. IMECE2018-88711

*Yu Cang, Eunsoo Kang, Bartłomiej Graczykowski, Max Planck Institute for Polymer research, Mainz, mainz, Germany, Hojin Kim, University of Delaware, Delaware, DE, United States, Maria Secchi, Maurizio Montagna, University of Trento, Trento, Italy, Rodney D. Priestley, Princeton University, Princeton, NJ, United States, Eric M Furst, University of Delaware, Delaware, DE, United States, George Fytas, Max Planck Institute for Polymer research, Mainz, mainz, Germany*

**2:27pm The Effect Of Randomness On The Wave Propagation Characteristics Of Open-Cell Foams**

Technical Presentation. IMECE2018-87861

*Alireza Bayat, Johns Hopkins, Baltimore, MD, United States, Stavros Gaitanaros, Johns Hopkins University, Baltimore, MD, United States*

**2:48pm Anisotropic Sub-GHz Phonon Propagation In Fibrous Plant Cell Walls**

Technical Presentation. IMECE2018-88622

*Maroun Abi Ghanem, University of California San Diego, La Jolla, CA, United States, Liliane Khoryati, Benaroya Research Institute at Virginia Mason, Seattle, WA, United States, Samuel Raetz, Le Mans Université, Le Mans, France, Amey Khanolkar, University of Washington, Seattle, WA, United States, Nicholas Boechler, University of California San Diego, La Jolla, CA, United States, Thomas Dehoux, Université Claude Bernard Lyon1, Villeurbanne, France*

**3:09pm Thermal conductivity reduction by full-spectrum phonon-resonance hybridizations**

Technical Presentation. IMECE2018-87451

*Hossein Honarvar, Prof., Boulder, CO, United States, Mahmoud Hussein, University of Colorado Boulder, Boulder, CO, United States*

## 1-3 COMPUTATIONAL ACOUSTICS

### 1-3-1 Computational Acoustics

**Third Floor, David L. Lawrence Convention Center, Room 302 1:45pm - 3:30pm**

Session Chair: **Sue Sung**, *Ford, Dearborn, MI, United States*

Session Co-Chair: **Albert Kirwan**, *Electric Boat, Groton, CT, United States*

**1:45pm Modeling the Wind Turbine Profiles Assuring the Maximum Lift Force With Low-Noise Operation for Variable Wind Velocities**

Technical Paper Publication. IMECE2018-86795

*Victorita Radulescu, University POLITEHNICA of Bucharest, Bucharest, Romania*

**2:06pm An Acoustic Analogy to Evaluate the Total Acoustic Power of a Cooling Fan Using Mesh Morpher Optimizer**

Technical Paper Publication. IMECE2018-86873

*Mike Kheirallah, Advanced Safety and Energy, Flint, MI, United States, Badih Jawad, Lawrence Technological University, Dearborn Heights, MI, United States, Abdallah Hamieh, Liping Liu, Lawrence Technological University, Southfield, MI, United States*

**2:27pm Structural-Acoustic Modeling & Optimization of a Submarine Pressure Hull**

Technical Presentation. IMECE2018-89535

*James Spain, University of Michigan, Ann Arbor, MI, United States, Geng Zhang, Sergey Medyanik, MES, Ann Arbor, MI, United States, Nickolas Vlahopoulos, University of Michigan, Ann Arbor, MI, United States*

**2:48pm Numerical Prediction of Hood Lift and Vibration of Trailing Automobiles**

Technical Presentation. IMECE2018-89627

*Rodrigo Auza Gutierrez, Jack McNamara, The Ohio State University, Columbus, OH, United States, Austin Kimbrell, Peter Kang, Honda R&D Americas, Inc, Raymond, OH, United States*

## 1-8 VIBRATION AND ACOUSTIC MEASUREMENTS, SIGNAL PROCESSING, AND TEST FACILITIES

### 1-8-2 Vibration and Acoustic Measurements, Signal Processing, and Test Facilities II

Fourth Floor, David L. Lawrence Convention Center,  
Room 403 1:45pm - 3:30pm

Session Chair: **Robert Tomko**, *Naval Nuclear Laboratory, South Park, PA, United States*

#### **1:45pm Use of Ultrasonic and Audio Signals to Monitor Temperature in Stratospheric Balloons**

Technical Paper Publication. IMECE2018-87131

*Matthew C. Jones*, *South Dakota School of Mines and Technology, Westminister, CO, United States*, *Jason T. Ash*, *South Dakota School of Mines and Technology, Rapid City, SD, United States*, *Michael Smith*, *Raven Aerostar International Inc., Sulphur Springs, TX, United States*, *Charles R. Tolle*, *South Dakota School of Mines and Technology, Rapid City, SD, United States*

#### **2:06pm The Study of Holey Cavity in the Application of Thermoacoustics Imaging**

Technical Paper Publication. IMECE2018-87757

*Chang Liu*, *Ashkan Ghanbarzadeh Dagheyan*, *Juan Heredia Juesas*, *Ali Molaei*, *Jose Martinez Lorenzo*, *Northeastern University, Boston, MA, United States*

#### **2:27pm Application of a Resonant Metamaterial Line Array in Ultrasound Compressive Imaging**

Technical Paper Publication. IMECE2018-88111

*Ashkan Ghanbarzadeh Dagheyan*, *Ali Molaei*, *Juan Heredia Juesas*, *Jose Martinez Lorenzo*, *Northeastern University, Boston, MA, United States*

#### **2:48pm A Holey Cavity for High-Capacity Ultrasound Imaging**

Technical Paper Publication. IMECE2018-88028

*Ashkan Ghanbarzadeh Dagheyan*, *Juan Heredia Juesas*, *Chang Liu*, *Ali Molaei*, *Jose Martinez Lorenzo*, *Northeastern University, Boston, MA, United States*

## 1-1 PHONONIC CRYSTALS AND METAMATERIALS

### 1-1-3 Design of Phononic Crystals and Metamaterials

Third Floor, David L. Lawrence Convention Center,  
Room 301 3:45pm - 5:30pm

Session Chair: **Nicholas Boechler**, *University of Washington, Seattle, WA, United States*

#### **3:45pm Design of Acoustic Metamaterials Using Gradient Based Optimization**

Technical Paper Publication. IMECE2018-88254

*Feruzha Amirkulova*, *San Jose State University, San Jose, CA, United States*, *Andrew Norris*, *Rutgers University, Piscataway, NJ, United States*

#### **4:06pm "Broadening the Bandgaps of Sonic Crystals by Varying Shapes, Sizes and Orientations of the Scatterers"**

Technical Paper Publication. IMECE2018-87398

*Debasish Panda*, *IIT Kharagpur, Kharagpur, West Bengal, India*, *Amiya Ranjan Mohanty*, *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

#### **4:27pm Broadband Control of Propagating Waves Using Smooth Changes in Flexural Rigidity: Lenses, Cloaks, and Acoustic Patterns**

Technical Presentation. IMECE2018-87654

*Amir Darabi*, *Georgia Institute of Technology, Atlanta, GA, United States*, *Michael Leamy*, *Georgia Institute of Technology, Marietta, GA, United States*

#### **4:48pm Tunable Tensegrity Metastructure for Compression-torsion Coupled Wave Control**

Technical Presentation. IMECE2018-87338

*Rui Zhu*, *Yitian Wang*, *Xiaoning Liu*, *Gengkai Hu*, *Beijing Institute of Technology, Beijing, China*

#### **5:09pm A Metamaterials Design Approach from Discrete Models**

Technical Presentation. IMECE2018-87903

*Kathryn Matlack*, *University of Illinois Urbana-Champaign, Urbana, IL, United States*, *Marc Serra*, *ETH Zurich, Zurich, Switzerland*, *Antonio Palermo*, *California Institute of Technology, Pasadena, CA, United States*, *Sebastian Huber*, *ETH Zurich, Zurich, Switzerland*, *Chiara Daraio*, *California Institute of Technology, Pasadena, CA, United States*

## 1-6 FLOW-INDUCED ACOUSTICS AND HUMAN PERCEPTION OF NOISE

### 1-6-1 Flow-Induced Acoustics and Human Perception of Noise

Third Floor, David L. Lawrence Convention Center,  
Room 302 3:45pm - 5:30pm

Session Chair: **Robert Tomko**, *Naval Nuclear Laboratory, South Park, PA, United States*

Session Co-Chair: **Haijun Liu**, *Temple University, Philadelphia, PA, United States*

#### **3:45pm Human response and perception of UAV noise in simulated warehouse environments**

Technical Presentation. IMECE2018-88081

*Jesse Callanan*, *Payam Ghassemi*, *James Dimartino*, *Christina Stocking*, *Souma Chowdhury*, *University at Buffalo (SUNY), Buffalo, NY, United States*, *Mostafa Nouh*, *University at Buffalo, Buffalo, NY, United States*

#### **4:06pm A bio-inspired pressure difference receiver with optical detection**

Technical Presentation. IMECE2018-88945

*Qian Dong*, *Haijun Liu*, *Temple University, Philadelphia, PA, United States*

**4:27pm**      **Quadruple Flow and Acoustic Coincident Resonance of Rotating Bladed Disks Interacting With Stationary Elements**

Technical Paper Publication. IMECE2018-86303

*Frank Kushner, Frank Kushner Consulting, Delmont, PA, United States*

**4:48pm**      **The Physics of Deep Surge in an Automotive Turbocharger Centrifugal Compression System**

Technical Paper Publication. IMECE2018-87716

*Rick Dehner, Ahmet Selamet, The Ohio State University, Columbus, OH, United States*

**5:09pm**      **Experimental Study on the Leakage and Rotordynamic Coefficients of a Long Smooth Seal at Laminar Flow Conditions**

Technical Paper Publication. IMECE2018-88717

*Min Zhang, Praxair, Inc., Tonawanda, NY, United States, Dara Childs, Texas A & M Univ, College Station, TX, United States*

**1-8 VIBRATION AND ACOUSTIC MEASUREMENTS, SIGNAL PROCESSING, AND TEST FACILITIES**

**1-8-3 Vibration and Acoustic Measurements, Signal Processing, and Test Facilities III**

**Fourth Floor, David L. Lawrence Convention Center, Room 403      3:45pm - 5:30pm**

Session Chair: **Kristin Cody**, *Naval Nuclear Laboratory, Jefferson HIs, PA, United States*

Session Co-Chair: **Zhongquan Chang**, *University of Kansas, Lawrence, KS, United States*

**3:45pm**      **On the Dynamic Loading Effects of Soil on Plastic Water Distribution Pipes and its Significance for Leak Detection Using Acoustics**

Technical Paper Publication. IMECE2018-87420

*Oscar Scussel, Michael J. Brennan, Univ Estadual Paulista - UNESP, Ilha Solteira, São Paulo, Brazil, Jennifer M. Muggleton, Institute of Sound and Vibration Research, University of Southampton, Southampton, United Kingdom, Fabrício César Lobato de Almeida, Univ Estadual Paulista - UNESP, Tupã, São Paulo, Brazil, Amarildo Tabone Paschoalini, Univ Estadual Paulista - UNESP, Ilha Solteira, São Paulo, Brazil*

**4:06pm**      **Capturing BW Zone in an Intact Rotor System**

Technical Paper Publication. IMECE2018-87480

*Fatima Alhammedi, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir., Mohammad AL-Shudeifat, Khalifa University, Abu Dhabi, Abu Dhabi, United Arab Emir., Oleg Shirayayev, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir.*

**4:27pm**      **Research on the Weak Signal Detection of Bearing Fault Based on Duffing Oscillator**

Technical Paper Publication. IMECE2018-86892

*Long Hao, Dan Liu, Fei Liu, Qingxin Wang, Lin Liang, Guanghua Xu, Xi'an Jiaotong University, Xi'an, China*

**4:48pm**      **Deep Convolutional Neural Network for Early Disk Crack Diagnosis Under Variable Speed**

Technical Paper Publication. IMECE2018-87247

*Ruonan Liu, Ruqiang Yan, Meng Ma, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Xuefeng Chen, Xi'an Jiaotong Univ (Mech Engrg), Xi'an, Shaanxi, China*

**TUESDAY, NOVEMBER, 13**

**1-13 PLENARY**

**1-13-1 Acoustics, Vibration, and Phononics Plenary**

**Third Floor, David L. Lawrence Convention Center, Room 305      8:00am - 8:45am**

**8:00am**      **Active Acoustic Metamaterials**

Plenary Presentation. IMECE2018-90090

*Amr Baz, Univ Of Maryland, College Park, MD, United States*

**1-1 PHONONIC CRYSTALS AND METAMATERIALS**

**1-1-4 Topological Phononics I**

**Third Floor, David L. Lawrence Convention Center, Room 302      10:00am - 11:45am**

Session Chair: **Mostafa Naim**, *University at Buffalo, Buffalo, NY, United States*

**10:00am**      **Topological Phononic Crystals**

Technical Presentation. IMECE2018-87617

*Zeguo Chen, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, Jun Mei, Department of Physics, South China University of Technology, Guangzhou, OO, China, Ying Wu, KAUST, Thuwal, Saudi Arabia*

**10:21am**      **One-dimensional linear bidirectional acoustic diodes**

Technical Presentation. IMECE2018-86801

*Weiqiu Chen, Zhejiang Univ, Hangzhou, China*

**10:42am**      **Non-reciprocal Wave Phenomena through Pump-signal Wave Interaction in Discrete Metastructures Undergoing Large Deformation**

Technical Presentation. IMECE2018-87976

*Samuel P. Wallen, Applied Research Laboratories - The University of Texas at Austin, Austin, TX, United States, Benjamin M. Goldsberry, Michael R. Haberman, Dept. of Mechanical Engineering & Applied Research Laboratories, The University of Texas at Austin, Austin, TX, United States*

**11:03am**      **Use of Betti-Reciprocity in Metamaterials**

Technical Presentation. IMECE2018-86358

*Amir Ashkan Mokhtari, Ankit Srivastava, Illinois Institute of Technology, Chicago, IL, United States*

**Draft Program**

**11:24am** Demonstration of Topological Wave-guiding in Locally Resonant Plate Structures  
Technical Presentation. IMECE2018-87774  
*Rajesh Chaunsali, Chun-Wei Chen, Jinkyu Yang, University of Washington, Seattle, WA, United States*

## 1-4 STRUCTURAL-ACOUSTIC SYSTEM IDENTIFICATION

### 1-4-1 Structural-Acoustic System Identification

**Fourth Floor, David L. Lawrence Convention Center, Room 405 10:00am - 11:45am**

Session Chair: **Weidong Zhu**, *University of Maryland, Baltimore County, Baltimore, MD, United States*

Session Co-Chair: **Yongfeng Xu**, *University of Cincinnati, Cincinnati, OH, United States*

**10:00am** Detection of Misfire in a Six-Cylinder Diesel Engine Using Acoustic Emission Signals  
Technical Paper Publication. IMECE2018-86506

*Mohammad Jafari, Queensland University of Technology, Brisbane, Queensland, Australia, Pietro Borghesani, University of New South Wales, Sydney, New South Wales, Australia, Puneet Verma, Queensland University of Technology, Brisbane, Queensland, Australia, Ashkan Eslaminejad, North Dakota State University, Fargo, ND, United States, Zoran D. Ristovski, Richard J. Brown, Queensland University of Technology, Brisbane, Queensland, Australia*

**10:21am** An acoustic field reconstruction method of Near-field Acoustic Radiation modes decomposition

Technical Presentation. IMECE2018-88940

*Jie Wang, Zhejiang University of Technology, Zhejiang, Zhejiang, China, Zubin Liu, Zhejiang University of Technology, Hangzhou, Zhejiang, China, liying jiang, Zhejiang University of Technology, Zhejiang, China, Huancai Lu, Zhejiang University of Technology, Hangzhou, China*

**10:42am** Operational Modal Analysis and Damage Identification of Structures Undergoing Random Vibration Using a Continuously Scanning Laser Doppler Vibrometer System

Technical Paper Publication. IMECE2018-88058

*Daming Chen, University of Maryland, Baltimore County, Baltimore, MD, United States, Yongfeng Xu, University of Cincinnati, Cincinnati, OH, United States, Weidong Zhu, University of Maryland, Baltimore County, Baltimore, MD, United States*

**11:03am** Reducing structure-borne sound radiation via vibro-acoustic analysis

Technical Presentation. IMECE2018-88769

*Lingguang Chen, Sean Wu, Yazhong Lu, Wayne State Univ, Detroit, MI, United States*

**11:24am** Nonlinear Vibration Analysis of a Fractional Viscoelastic Euler-Bernoulli Microbeam

Technical Paper Publication. IMECE2018-87061

*Firooz Bakhtiari-Nejad, Ehsan Loghman, Mostafa Pirasteh, Amirkabir University of Technology, Tehran, MD, United States*

## 1-12 CONGRESS-WIDE SYMPOSIUM ON NDE &SHM: ULTRASONIC WAVES FOR MATERIAL CHARACTERIZATION AND DAMAGE ASSESSMENT

**1-12-1 NDE & SHM: Ultrasonic waves for material characterization and damage assessment**

**Third Floor, David L. Lawrence Convention Center, Room 301 10:00am - 11:45am**

Session Chair: **Yongfeng Xu**, *University of Cincinnati, Cincinnati, OH, United States*

Session Co-Chair: **Weidong Zhu**, *University of Maryland, Baltimore County, Baltimore, MD, United States, Firooz Bakhtiari-Nejad, Amirkabir University of Technology, Tehran, MD, United States*

**10:00am** Elasto-Plastic Modeling of Beams for Impedance Based Structural Health Monitoring  
Technical Paper Publication. IMECE2018-87910

*Naserodin Sepehry, Shahrood University of Technology, Shahrood, Iran, Firooz Bakhtiari-Nejad, Amirkabir University of Technology, Tehran, MD, United States, Weidong Zhu, University of Maryland, Baltimore County, Baltimore, MD, United States*

**10:21am** Real-time imaging of damage precursors in complex composites

Technical Presentation. IMECE2018-88816

*Fatemeh Pourahmadian, University of Colorado Boulder, Boulder, CO, United States*

**10:42am** Computational Time - Domain Wave Modeling in Anisotropic Plate

Technical Presentation. IMECE2018-88863

*Sajan Shrestha, Sourav Banerjee, University of South Carolina, Columbia, SC, United States*

**11:03am** Passive Extraction of Green's Function of Solids and Application to High-speed Rail Inspection

Technical Presentation. IMECE2018-89371

*Francesco Lanza Di Scalea, Albert Liang, Simone Sternini, University of California San Diego, La Jolla, CA, United States, Margherita Capriotti, UC San Diego, San Diego, CA, United States*

**11:24am** Generation and Propagation of Rayleigh Surface Wave in Anisotropic Materials by Line-Focus Ultrasonic Transducer

Technical Presentation. IMECE2018-88278

*Qiuyan Li, Chenglong Ji, Yuxiang Wang, Qing-Ming Wang, University of Pittsburgh, Pittsburgh, PA, United States*

## 1-1 PHONONIC CRYSTALS AND METAMATERIALS

### 1-1-5 Topological Phononics II

**Third Floor, David L. Lawrence Convention Center, Room 301 1:45pm - 3:30pm**

Session Chair: **Jinkyu Yang**, *University of Washington, Seattle, WA, United States*

**1:45pm**      **The Applicability of the Principle of Reciprocity in Acoustic Metamaterials**

Technical Presentation. IMECE2018-88611

*Allan Pierce, Retired, East Sandwich, MA, United States*

**2:06pm**      **Topological mechanics of edge waves in Kagome lattices**

Technical Presentation. IMECE2018-88195

*Hui Chen, Hussein Nassar, University of Missouri-Columbia, COLUMBIA, MO, United States, Guoliang Huang, University of Missouri, COLUMBIA, MO, United States*

**2:27pm**      **Experimental Observation of Valley-Hall Edge States in Elastic Waveguides Based on Diatomic-Graphene-Like Phononic Crystals**

Technical Presentation. IMECE2018-89423

*Hongfei Zhu, Fabio Semperlotti, Ting-Wei Liu, Purdue University, West Lafayette, IN, United States*

**2:48pm**      **Universal Wave Manipulation by Periodic Gyro-Elastic Structures**

Technical Presentation. IMECE2018-88926

*Mohammad Ali Attarzadeh, University At Buffalo, Tonawanda, NY, United States, Mostafa Nouh, University at Buffalo, Buffalo, NY, United States*

**1-1-6 Theory, Computation, and Experiments in Phononics**

**Third Floor, David L. Lawrence Convention Center, Room 302      1:45pm - 3:30pm**

Session Chair: *Kathryn M. Jack, University of Illinois Urbana-Champaign, Urbana, IL, United States*

**1:45pm**      **Study On Generation Of Dual-Dirac Cone At  $k \neq 0$  And It's Features By Angle Based Tunable Engineered Phononic Crystal.**

Technical Presentation. IMECE2018-89099

*Mustahseen Indaleeb, Hossain Ahmed, Sourav Banerjee, University of South Carolina, Columbia, SC, United States*

**2:06pm**      **Modeling and Experimentation on 3D Printed Decoupled and Mixed Mode Mechanical Metamaterials**

Technical Presentation. IMECE2018-88336

*Alireza Amirkhizi, Fateme Aghighi, Joshua Morris, Weidi Wang, University of Massachusetts, Lowell, Lowell, MA, United States*

**2:27pm**      **Deep Convolutional Neural Networks for Eigenvalue Problems in Mechanics**

Technical Presentation. IMECE2018-87281

*David Finol, Yan Lu, Illinois Institute of Technology, Chicago, IL, United States, Vijay Mahadevan, Amazon AWS AI, Seattle, IL, United States, Ankit Srivastava, Illinois Institute of Technology, Chicago, IL, United States*

**2:48pm**      **The Phononic Problem Under the Spectral Theorem**

Technical Presentation. IMECE2018-89670

*Ankit Srivastava, Illinois Institute of Technology, Chicago, IL, United States*

**1-11 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM: ACOUSTIC AND VIBRATION METHODS IN STRUCTURAL HEALTH MONITORING AND NON-DESTRUCTIVE TESTING**

**1-11-1 NDE & SHM: Acoustic and vibration methods in structural health monitoring and nondestructive testing**

**Fourth Floor, David L. Lawrence Convention Center, Room 405      1:45pm - 3:30pm**

Session Chair: *Weidong Zhu, University of Maryland, Baltimore County, Baltimore, MD, United States*

Session Co-Chair: *Yongfeng Xu, University of Cincinnati, Cincinnati, OH, United States*

**1:45pm**      **Effect of Angular Acceleration and Unbalance Force Orientation on the Backward Whirl in Cracked Rotors**

Technical Paper Publication. IMECE2018-87476

*Fatima Alhamadi, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir., Mohammad AL-Shudeifat, Khalifa University, Abu Dhabi, Abu Dhabi, United Arab Emir., Oleg Shirayev, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir.*

**2:06pm**      **A nondestructive evaluation method based on the propagation of nonlinear solitary waves**

Technical Presentation. IMECE2018-87555

*Amir Nasrollahi, Piervincenzo Rizzo, University of Pittsburgh, Pittsburgh, PA, United States*

**2:27pm**      **Transmission of Information by Acoustic Communication along Metal Pathways in Nuclear Facilities**

Technical Presentation. IMECE2018-88155

*Alexander Heifetz, Richard Vilim, Sasan Bakhtiari, Argonne National Laboratory, Lemont, IL, United States*

**2:48pm**      **?Flute without Flute? ? An Experiment in Turbulence Management**

Technical Presentation. IMECE2018-88722

*B. G. Shiva Prasad, Fluid Thermal Technologies, Sidney, OH, United States*

**1-1 PHONONIC CRYSTALS AND METAMATERIALS**

**1-1-7 Control of Phononic Crystals and Metamaterials**

**Third Floor, David L. Lawrence Convention Center, Room 301      3:45pm - 5:30pm**

Session Chair: *Mahmoud Hussein, University of Colorado Boulder, Boulder, CO, United States*

Session Co-Chair: *Liang-Wu Cai, Kansas State University, Manhattan, KS, United States*

**3:45pm**      **Active Acoustic Metamaterials With Programmable Densities Using an H-â??**

Controller

Technical Paper Publication. IMECE2018-87749

*Amr Baz, Univ Of Maryland, College Park, MD, United States*

**4:06pm** A Programmable Metasurface for Real Time Control of Broadband Elastic Rays

Technical Presentation. IMECE2018-88554

*Yangyang Chen, Xiaopeng Li, Hussein Nassar, Guoliang Huang, University of Missouri, Columbia, MO, United States*

**4:27pm** The Auxetic Nature of Shunted Piezoelectrics

Technical Presentation. IMECE2018-89490

*Carson Willey, UES, Inc./AFRL, WPAFB, OH, United States, Philip Buskohl, Abigail Juhl, AFRL/RXAS, Wpafb, OH, United States*

**4:48pm** TUNABLE PHONONIC CRYSTALS WITH KIRI-GAMI-BASED STRUCTURES

Technical Presentation. IMECE2018-88877

*Ronghao BAO, Zhejiang Univeristy, Hangzhou, Zhejiang, China*

**5:09pm** 3D Printed Magnetorheological Elastomer Metastructures with Magnetically-Tunable Band Gaps

Technical Presentation. IMECE2018-89586

*Connor D. Pierce, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Vincent Chen, James Hardin, Carson Willey, UES, Inc./AFRL, WPAFB, OH, United States, Dan Berrigan, Air Force Research Laboratory, Wright Pat, OH, United States, Abigail Juhl, AFRL/RXAS, WPAFB, OH, United States, Kathryn Matlack, University of Illinois Urbana-Champaign, Urbana, IL, United States*

Advanced Manufacturing  
WEDNESDAY, NOVEMBER, 14

## 2-1 ADVANCED MANUFACTURING PLENARY

2-1-1 Advanced Manufacturing Plenary

Third Floor, David L. Lawrence Convention Center,  
Room 305 9:00am - 9:45am

**9:00am** Manufacturing for X

Plenary Presentation. IMECE2018-90091

*Jian Cao, Northwestern Univ, Evanston, IL, United States*

## 2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

**2-2-1 Congress-Wide Symposium on Additive Manufacturing: Metals - Directed Energy Deposition I**

Third Floor, David L. Lawrence Convention Center,  
Room 301 10:00am - 11:45am

Session Chair: **Scott Thompson**, Auburn University, Auburn, AL, United States

Session Co-Chair: **Nima Shamsaei**, Auburn University, Auburn, AL, United States, **Roosbeh (Ross) Salary**, Marshall University, Huntington, WV, United States

**10:00am** Thermal-Mechanical Study of 3D Printing Technology for Rail Repair

Technical Paper Publication. IMECE2018-86315

*Ershad Mortazavian, University of Nevada Las Vegas (UNLV), Las Vegas, NV, United States, Zhiyong Wang, University of Nevada, Las Vegas, Las Vegas, NV, United States, Hualiang Teng, University of Nevada, Las Vegas (UNLV), Henderson, NV, United States*

**10:21am** Additive Manufacturing Bead Deposition Based Rotary Tool Path Applications

Technical Paper Publication. IMECE2018-86461

*Ruth Jill Urbanic, University of Windsor, La Salle, ON, Canada, Robert Hedrick, CAMufacturing Solutions Inc., La Salle, ON, Canada*

**10:30am** Directed Energy Deposition of Magnesium Alloy Ni-Mn-Ga: Towards Epitaxial Growth

Technical Presentation. IMECE2018-87160

*Jakub Toman, University of Pittsburgh, Pittsburgh, PA, United States, Peter Müllner, Boise State University, Boise, ID, United States, Markus Chmielus, University of Pittsburgh, Pittsburgh, PA, United States*

**11:03am** ODS Coating for Critical Turbine Components Using DED Additive Manufacturing

Technical Paper Publication. IMECE2018-87512

*Eric Chia, West Virginia University, Morgantown, WV, United States, Bruce Kang, West Virginia Univ, Morgantown, WV, United States, Zheng Min, University of Pittsburgh, Wexford, PA, United States, Yang Li, University of Pittsburgh, Pittsburgh, PA, United States, Minking Chyu, Univ Of Pittsburgh, Pittsburgh, PA, United States*

**11:24am** Effect of welding mode on microstructure and mechanical properties of aluminum fabricated by wire and arc additive manufacturing

Technical Presentation. IMECE2018-88703

*Xuwei Fang, Xi'An Jiaotong Univ. National Innovation Institute of Additive Manufacturing, Xi'an, China, Lijuan Zhang, National Innovation Institute of Additive Manufacturing, Xi'an, China, Bingheng Lu, Xi'An Jiaotong Univ. National Innovation Institute of Additive Manufacturing, Xi'an, China*

Draft Program

## 2-5 MANUFACTURING OF ATOMICALLY-THIN, TWO-DIMENSIONAL MATERIALS

### 2-5-1 Mechanics and Physics of 2D Materials

**Third Floor, David L. Lawrence Convention Center,  
Room 304 10:00am - 11:45am**

Session Chair: **Pilgyu Kang**, *George Mason University, Fairfax, VA, United States*

Session Co-Chair: **SungWoo Nam**, *University of Illinois, Urbana-Champaign (UIUC), 4418 Mechanical Engineering Lab, IL, United States*, **Mike Cai Wang**, *University of South Florida, Tampa, FL, United States*

**10:00am Large-area Solution-manufactured Air-stable 2D Material for High-performance Electronics and Smart Sensors**

**Invited Presentation.** IMECE2018-86603

**Wenzhuo Wu**, *Purdue University, West Lafayette, IN, United States*

**10:42am Large-scale nano-manufacturing of highly-uniform 0D/1D/2D heterostructures via self-assembly**

**Technical Presentation.** IMECE2018-89830

**Michael Cai Wang**, *University of South Florida, Tampa, FL, United States*, **Matthew Thomas Gole**, **Juyoung Leem**, **Wayne Lin**, **Rachel Ziran Zhou**, **Paolo Furlanetto Ferrari**, **Arend van der Zande**, **Catherine Jones Murphy**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **SungWoo Nam**, *University of Illinois, Urbana-Champaign (UIUC), 4418 Mechanical Engineering Lab, IL, United States*

**11:03am Spatial Nanomechanical mapping of Graphene Monolayers on Crystalline Substrates**

**Technical Presentation.** IMECE2018-89489

**Matt Robertson**, **Kaihao Zhang**, **Matt Poss**, *University of Illinois at Urbana Champaign, Urbana, IL, United States*, **Sameh Tawfik**, *University of Illinois Urbana Champaign, Urbana, IL, United States*

**11:24am Anomalous Corrosion Dynamics of Two-Dimensional(2D) Layered Materials**

**Technical Presentation.** IMECE2018-89856

**Yu-ting Huang**, *Honk Kong university, Pok Fu Lam, Hong Kong, Hong Kong*, **Akhil Dodda**, *Pennsylvania State University, State college, PA, United States*, **Amritanand Sebastian**, *Pennsylvania State University, UNIVERSITY PARK, PA, United States*, **Daniel Schulman**, *Penn State University, UNIVERSITY PARK, PA, United States*, **Saptarshi Das**, *Pennsylvania State University, State college, PA, United States*

## 2-6 ADVANCED MACHINING AND FINISHING

### 2-6-1 Advanced Surface Modification using Machining

**Third Floor, David L. Lawrence Convention Center,  
Room 305 10:00am - 11:45am**

Session Chair: **Pawan Tyagi**, *University of the District of Columbia, Washington, DC, United States*

Session Co-Chair: **Muhammad Jahan**, *Miami University, Oxford, OH, United States*

**10:00am Study on Grinding Force and Surface Roughness of Ni3Al Based Superalloy**

**Technical Paper Publication.** IMECE2018-86959

**Xiaoxiang Zhu**, *Northwestern Polytechnical University, Xi'an, Shaanxi, China*, **Wenhu Wang**, **Ruisong Jiang**, *Northwestern Polytechnical University, Xi'an, Shaanxi, China*, **Xiaofen Liu**, *Northwestern Polytechnical University, Xi'an, Shaanxi, China*

**10:21am Scanning Electron Microscopy and Optical Profilometry of Electropolished Additively Manufactured 316 Steel Components**

**Technical Paper Publication.** IMECE2018-88339

**Pawan Tyagi**, **Tobias Goulet**, **Denikka Brent**, *University of the District of Columbia, Washington, DC, United States*, **Francisco Garcia-Moreno**, *Department of Energy's National Security Campus, managed by Honeywell, Kansas City, MO, United States*, **Kate Klein**, *University of the District of Columbia, Washington, DC, United States*

**10:42am Chemical Polishing Based Surface Finishing of 3D Printed Steel Components**

**Technical Paper Publication.** IMECE2018-88378

**Pawan Tyagi**, **Tobias Goulet**, **Nitt Chuenprateep**, **Robert Stephenson**, **Rudolph Knott**, **Antione Reddick**, *University of the District of Columbia, Washington, DC, United States*, **Justin Schlitzer**, *Kansas City National Security Campus managed by Honeywell, Kansas City, MO, United States*, **Francisco Garcia-Moreno**, *Department of Energy's National Security Campus, managed by Honeywell, Kansas City, MO, United States*, **Cordell Benton**, *Kansas City National Security Campus managed by Honeywell, Kansas City, MO, United States*, **Devdas Shetty**, *University of the District of Columbia, Washington, DC, United States*

**11:03am Improved mechanical properties and hierarchical surfaces of 316 stainless steel processed by Ultrasonic Nanocrystal Surface Modification**

**Technical Presentation.** IMECE2018-89950

**Xiaoning Hou**, **Jun Liu**, *The University of Akron, Akron, OH, United States*, **Hao Zhang**, *University of akron, Akron, OH, United States*, **Gary Doll**, *The University of Akron, Akron, OH, United States*, **Ashlie Martini**, *University of California -Merced, Atwater, CA, United States*, **Yalin Dong**, *The University of Akron, Akron, OH, United States*, **Chang Ye**, *University of Akron, Peninsula, OH, United States*

**11:24am Influence of Surface Pretreatment on the Hydrophobic Silane Coating on AISI 304 Steel**

**Technical Paper Publication.** IMECE2018-86256

**Akinsanya Damilare Baruwa**, *University of Johannesburg, Johannesburg, Gauteng, South Africa*, **Oluseyi Philip Oladijo**, *Botswana International University of Science and Technology, Palapye, Palapye, Botswana*, **Nthabiseng Maledi**, *University of the Witwatersrand, Johannesburg, Gauteng, South Africa*, **Es-ther Akinlabi**, *University of Johannesburg, Johannesburg, South Africa*

## 2-13 ROBOTICS & AUTOMATION IN ADVANCED MANUFACTURING

### 2-13-1 Congress-Wide Symposium on Additive Manufacturing: Robotic Additive Manufacturing

Third Floor, David L. Lawrence Convention Center, Room 302 10:00am - 11:45am

Session Chair: **Daniel Cox**, Georgia Southern University, Statesboro, GA, United States

Session Co-Chair: **Andrzej Nycz**, Oak Ridge National Laboratory, Oak Ridge, TN, United States

#### 10:00am High-Throughput 3D Metal Printing Technical Presentation. IMECE2018-87216

**Michael R. Sullivan**, University at Buffalo, SUNY, Buffalo, NY, United States, **Deborah D.L. Chung**, Univ At Buffalo, State Univ of NY, Buffalo, NY, United States

#### 10:21am The Effects of Direct Energy Deposition Processes on the Thermal Properties of Invar Technical Presentation. IMECE2018-89770

**Alex Arbogast**, Oak Ridge National Laboratory, Knoxville, TN, United States, **Mark W. Noakes**, **Christopher Masuo**, **Andrzej Nycz**, Oak Ridge National Laboratory, Oak Ridge, TN, United States

#### 10:42am Weld Pool and Bead Characterization for Gravity Aligned (GA) and Non-Gravity Aligned (NGA) Wire-Arc Additive Manufacturing Technical Presentation. IMECE2018-89787

**Joshua Penney**, University of Tennessee, Knoxville, TN, United States, **William Hamel**, Univ Of Tennessee, Knoxville, TN, United States, **J. L. McNeil**, University of Tennessee, Knoxville, TN, United States

#### 11:03am A Framework for Path Planning of Large Scale Additive Metals Manufacturing in Arbitrary Directions Technical Presentation. IMECE2018-89824

**James McNeil**, University of Tennessee, Knoxville, TN, United States, **William Hamel**, Univ Of Tennessee, Knoxville, TN, United States, **Josh Penney**, University of Tennessee, Knoxville, TN, United States

#### 11:24am Effect of shielding gas on metal big area additive manufacturing Technical Presentation. IMECE2018-89723

**Bishal Silwal**, Georgia Southern University, Statesboro, GA, United States, **Andrzej Nycz**, **Mark W. Noakes**, **Christopher Masuo**, Oak Ridge National Laboratory, Oak Ridge, TN, United States, **Derek Vaughan**, University of Purdue, West Lafayette, IN, United States, **David Marsh**, ORNL, Oak Ridge, TN, United States

## 2-14 LASER-BASED ADVANCED MANUFACTURING AND MATERIALS PROCESSING

### 2-14-1 Surface Modification based on Laser Peening and Ablation

Third Floor, David L. Lawrence Convention Center, Room 306 10:00am - 11:45am

Session Chair: **Yeqing Wang**, Mississippi State University, Mississippi State, MS, United States

Session Co-Chair: **Chang Ye**, University of Akron, Peninsula, OH, United States

#### 10:00am Ablation Characteristics of Nano-second Laser Pulsed Ablation of Aluminum Technical Paper Publication. IMECE2018-87635

**Yeqing Wang**, Mississippi State University, Mississippi State, MS, United States, **Daniel Diaz**, University of Florida, Gainesville, FL, United States, **David Hahn**, Univ Of Florida, Gainesville, FL, United States

#### 10:21am Improvement of fatigue life of Tool Steel by laser shock peening Technical Presentation. IMECE2018-88868

**SACHIN PATIL**, Bharat Forge Ltd, pune, Maharashtra, India

#### 10:42am Microstructure Evolution in Ti64 Subjected to Laser-assisted Ultrasonic Nanocrystal Surface Modification Technical Presentation. IMECE2018-89553

**Jun Liu**, The University of Akron, Akron, OH, United States, **Sergey Suslov**, Qatar Environment and Energy Research Institute, Doha, Qatar, **Zhencheng Ren**, **Yalin Dong**, The University of Akron, Akron, OH, United States, **Chang Ye**, University of Akron, Peninsula, OH, United States

#### 11:03am The Effects of Laser Shock Peening on the Mechanical Properties and Biomedical Behavior of AZ31B Magnesium Alloy Technical Presentation. IMECE2018-89781

**Chang Ye**, University of Akron, Peninsula, OH, United States, **Ruixia Zhang**, The University of Akron, Akron, OH, United States, **Xianfeng Zhou**, Qingdao University of Science and Engineering, Qingdao, Select State/Province, China, **Hongyu Gao**, Saarland university, Saarbrücken, Germany, **Steven Mankoci**, The University of Akron, Akron, OH, United States, **Yang Liu**, North Carolina State University, Raleigh, NC, United States, **Xi-ahan Sang**, Center for Nanophase Materials Sciences, ORNL, Oak Ridge, TN, United States, **Haifeng Qin**, University of Akron, Akron, OH, United States, **Xiaoning Hou**, **Zhencheng Ren**, The University of Akron, Akron, OH, United States, **Gary Doll**, University of Akron, Akron, OH, United States, **Ashlie Martini**, University of California -Merced, Atwater, CA, United States, **Yalin Dong**, **Nita Sahai**, The University of Akron, Akron, OH, United States

#### 11:24am Effect Of Electron Beam Weld Bead Geometry On The Mechanical Properties Of Ti6Al4V Alloy Technical Presentation. IMECE2018-88866

**Sandeep Thakare**, Kalyani Centre for Technology and Innovation (KCTI), Bharat Forge Ltd., Pune, Maharashtra, India

## 2-15 DIGITAL MANUFACTURING SIMULATION AND VALIDATION

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### 2-15-1 Digital Manufacturing in Cyber-Manufacturing aspects

Third Floor, David L. Lawrence Convention Center, Room 303 10:00am - 11:45am

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Session Chair: **David Guerra-Zubiaga**, *Kennesaw State University, Marietta, GA, United States*

Session Co-Chair: **Kai He**, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China*, **Germanico Gonzalez-Badillo**, *Universidad Autonoma De San Luis Potosi, Rioverde San Luis Potosi, Mexico*

#### 10:00am Taxonomy for Secure CyberManufacturing Systems

Technical Paper Publication. IMECE2018-86091

**Mingtao Wu**, *Syracuse University, Fayetteville, NY, United States*, **Young Moon**, *Syracuse University, Syracuse, NY, United States*

#### 10:21am A Novel Framework in Manufacturing Automation to Implement Cyber-Manufacturing Systems

Technical Paper Publication. IMECE2018-88243

**David Guerra-Zubiaga**, *Kennesaw State University, Marietta, GA, United States*, **Kathy Schwaig**, *Kennesaw State University, Kennesaw, GA, United States*, **Mason Felix**, **John Calfee**, **Aubrey Sims**, *Kennesaw State University, Marietta, GA, United States*, **Tu Vo**, *Kennesaw State University, Kennesaw, GA, United States*

#### 10:42am Cybermanufacturing System: A Solution for Sustainable Manufacturing

Technical Paper Publication. IMECE2018-86092

**Zhengyi Song**, **Young Moon**, *Syracuse University, Syracuse, NY, United States*

#### 11:03am An Internet-of-Things Based Framework for Collaborative Cyber Physical Tasks in Micro Assembly

Technical Paper Publication. IMECE2018-88542

**J. Cecil**, *Oklahoma State Univ, Stillwater, OK, United States*, **Aaron Cecil-Xavier**, **SADIQ ALBUHAMOOD**, *Oklahoma State University, STILLWATER, OK, United States*

#### 11:24am A New Design of Cycloidal Planetary Reducer With Internal Cycloidal Profile

Technical Paper Publication. IMECE2018-86184

**He Mao**, **Guanyi Liu**, **Deqiang Zeng**, **Yaning Cao**, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China*, **Kai He**, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China*, **Ruxu Du**, *Chinese University Of Hong Kong, Hong Kong, Hong Kong*

## 2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

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### 2-2-2 Congress-Wide Symposium on Additive Manufacturing: Metals - Directed Energy Deposition II

Third Floor, David L. Lawrence Convention Center, Room 301 1:45pm - 3:30pm

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Session Chair: **Scott Thompson**, *Auburn University, Auburn, AL, United States*

Session Co-Chair: **Nima Shamsaei**, *Auburn University, Auburn, AL, United States*, **Ruth Jill Urbanic**, *University of Windsor, La Salle, ON, Canada*

#### 1:45pm Application of Electrostatic Adhesion Method in Metal-Powder-Based Additive Manufacturing Layer-Forming Process

Technical Paper Publication. IMECE2018-88741

**Teng-Yueh Tsao**, **Jen-Yuan (James) Chang**, *National Tsing Hua University, Hsinchu, Hsinchu, Taiwan*

#### 2:27pm Meshfree Simulation of Oxide Dispersion in Solid-state Additive Manufacturing of Aluminum Alloys

Technical Presentation. IMECE2018-89026

**Robert Escobar Jr**, *Department of Mechanical Engineering, The University of Alabama, Tuscaloosa, AL, United States*, **Kirk Fraser**, *National Research Council Canada, Saguenay, QC, Canada*, **J.B. Jordon**, **Paul Allison**, *Department of Mechanical Engineering, The University of Alabama, Tuscaloosa, AL, United States*

#### 2:45pm Application of a Fast-Solving Semi-Analytical Heat Transfer Model to Additive Manufacturing Alloy Development

Technical Presentation. IMECE2018-89880

**Nicholas Jones**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Jack Beuth**, *Carnegie Mellon Univ, Pittsburgh, PA, United States*, **Bryan Webler**, **Yining He**, *Carnegie Mellon University, Pittsburgh, PA, United States*

#### 3:09pm A Computational Fluid Dynamics (CFD) Study of Material Transport and Deposition in Aerosol Jet Printing (AJP) Process

Technical Paper Publication. IMECE2018-87647

**Roosbeh (Ross) Salary**, *Marshall University, Huntington, WV, United States*, **Jack P. Lombardi III**, **Darshana L. Weerawarne**, *State University of New York at Binghamton, Vestal, NY, United States*, **Prahalad Rao**, *University of Nebraska-Lincoln, Lincoln, NE, United States*, **Mark D. Poliks**, *State University of New York at Binghamton, Vestal, NY, United States*

## 2-5 MANUFACTURING OF ATOMICALLY-THIN, TWO-DIMENSIONAL MATERIALS

### 2-5-2 Sensors and Electronics of 2D Materials

Third Floor, David L. Lawrence Convention Center,  
Room 304 1:45pm - 3:30pm

Session Chair: **Pilgyu Kang**, *George Mason University, Fairfax, VA, United States*

Session Co-Chair: **Mike Cai Wang**, *University of South Florida, Tampa, FL, United States*, **SungWoo Nam**, *University of Illinois, Urbana-Champaign (UIUC), 4418 Mechanical Engineering Lab, IL, United States*

#### 1:45pm 2D Materials based Epidermal and Implantable Conformal Bioelectronics

Invited Presentation. IMECE2018-89975

**Nanshu Lu**, *University of Texas at Austin, Austin, TX, United States*

#### 2:27pm Air stable black phosphorus sensors for humidity detection

Technical Presentation. IMECE2018-89891

**Jinshui Miao**, **Junghoon Yeom**, *Michigan State University, East Lansing, MI, United States*, **Chuan Wang**, *Washington University in St. Louis, St. Louis, MO, United States*

#### 2:48pm Crumple nanostructuring of atomically-thin two-dimensional (2D) materials for flexible optoelectronic devices and plasmonic metamaterials

Technical Presentation. IMECE2018-89943

**Pilgyu Kang**, *George Mason University, Fairfax, VA, United States*

## 2-6 ADVANCED MACHINING AND FINISHING

### 2-6-2 Conventional Machining

Third Floor, David L. Lawrence Convention Center,  
Room 305 1:45pm - 3:30pm

Session Chair: **Lewis Payton**, *Auburn University, Auburn University, AL, United States*

Session Co-Chair: **P.V.M. Rao**, *IIT Delhi, NEW DELHI, India*

#### 1:45pm Determining Cutting Pressure Coefficients for Aluminum 6061-T6 Using a Small Number of Drilling Experiments

Technical Paper Publication. IMECE2018-86224

**Charbel Seif**, *American University Of Beirut, Beirut, Lebanon*, **Ilige Hage**, *Notre Dame University-Louaize, Zouk Mosbeh, Lebanon*, **Ramsey Hamade**, *American University Of Beirut, Beirut, Riad El Solh, Lebanon*

#### 2:06pm Dislocation Theory of Orthogonal Metal Cutting of Cu-Zn Alloys

Technical Paper Publication. IMECE2018-87634

**Lewis Payton**, *Auburn University, Auburn University, AL, United States*

#### 2:27pm Study on Turning of Non-Axisymmetric Three-Dimensional Curved Surfaces

Technical Paper Publication. IMECE2018-87377

**Taichi Mori**, **Yoshitaka Morimoto**, **Akio Hayashi**, *Kanazawa Institute of Technology, Nonoichi, Isikawa, Japan*, **Yoshiyuki Kaneko**, **Naohiko Suzuki**, **Ryo Hirono**, *Takamatsu Machinery CO., LTD, Isikawa, Isikawa, Japan*

#### 2:48pm Orthogonal Machining of Copper Alloy With a Hardness Gradient

Technical Paper Publication. IMECE2018-87524

**Lewis Payton**, *Auburn University, Auburn University, AL, United States*

#### 3:09pm Process Planning Strategies to Reduce Energy Consumption in Machining

Technical Paper Publication. IMECE2018-87735

**Arun Unnikrishnan**, **P.V.M. Rao**, *IIT Delhi, New Delhi, India*

## 2-13 ROBOTICS & AUTOMATION IN ADVANCED MANUFACTURING

### 2-13-2 Manipulators and Interfaces

Third Floor, David L. Lawrence Convention Center,  
Room 302 1:45pm - 3:30pm

Session Chair: **Daniel Cox**, *Georgia Southern University, Statesboro, GA, United States*

Session Co-Chair: **Andrzej Nycz**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

#### 1:45pm Additive Manufacturing-based Manipulator Design, Fabrication, and Testing

Technical Presentation. IMECE2018-89800

**Mark W. Noakes**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Bradley S. Richardson**, *Oak Ridge National Labs, Oak Ridge, TN, United States*

#### 2:06pm VR-Mediated Teleoperation With Glove-Like Interfaces

Technical Paper Publication. IMECE2018-87085

**Kun Chen**, **Prawesh Dahal**, **Mariam Avagyan**, **Kevin Huang**, *Trinity College, Hartford, CT, United States*

#### 2:27pm Torch End-Effector and TIG Electrode Changeout Design for a TIG Welding Robot Used in Metal Big Area Additive Manufacturing

Technical Paper Publication. IMECE2018-86726

**Christopher Masuo**, **Andrzej Nycz**, **Mark W. Noakes**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Jared Bell**, **Justin Killian**, **Chandler Oakley**, *The University of Tennessee - Knoxville, Knoxville, TN, United States*, **William Hamel**, *Univ Of Tennessee, Knoxville, TN, United States*

#### 2:48pm Welding Robotic Co-Worker Using Brain Computer Interface

Technical Paper Publication. IMECE2018-87503

**Yao Li**, *University of Illinois At Urbana-Champaign, Urbana, IL, United States*, **T. Kesavadas**, *University of Illinois Urbana-Champaign, Mahomet, IL, United States*

Draft Program

**3:09pm Intelligent Decision Making Approach for Performance Evaluation of a Robot-Based Manufacturing Cell**  
Technical Paper Publication. IMECE2018-86666

*Tavo Kangru, Tallinn University of Technology, Tallinn, Estonia, Jüri Riives, Innovative Manufacturing Engineering Systems Competence Centre, Tallinn, Select State/Province, Estonia, Tauno Otto, Meelis Pohlak, Kashif Mahmood, Tallinn University of Technology, Tallinn, Select State/Province, Estonia*

## **2-15 DIGITAL MANUFACTURING SIMULATION AND VALIDATION**

### **2-15-2 Digital Manufacturing in Digital Twin aspects**

**Third Floor, David L. Lawrence Convention Center, Room 303 1:45pm - 3:30pm**

Session Chair: **Germanico Gonzalez-Badillo**, *Universidad Autonoma De San Luis Potosi, Rioverde San Luis Potosi, Mexico*  
Session Co-Chair: **Kai He**, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China*, **David Guerra-Zubiaga**, *Kennesaw State University, Marietta, GA, United States*

**1:45pm Demonstration of an Industrial Framework for an Implementation of a Process Digital Twin**

Technical Paper Publication. IMECE2018-87361

*J.M. Eyre, Advanced Manufacturing Research Centre, Sheffield, Yorkshire, United Kingdom, T.J. Dodd, University of Sheffield, Sheffield, United Kingdom, C. Freeman, R. Lanyon-Hogg, A.J. Lockwood, R.W. Scott, Advanced Manufacturing Research Centre, Sheffield, United Kingdom*

**2:06pm Towards a Digital Twin for Cloud Manufacturing: Case Study**

Technical Paper Publication. IMECE2018-87688

*Diane Ngo, Kennesaw State University, Marietta, GA, United States, Reza Vatankhah-Barenji, Hacettepe University, Ankara, Turkey, Germanico Gonzalez-Badillo, Universidad Autonoma De San Luis Potosi, Rioverde San Luis Potosi, Mexico, David Guerra-Zubiaga, Kennesaw State University, Marietta, GA, United States*

**2:27pm Virtual Experimental Investigation for Industrial Robotics in Gazebo Environment**

Technical Paper Publication. IMECE2018-87686

*Murat Aksu, The National Institute of Standards and Technology, Gaithersburg, MD, United States, Frederick Proctor, NIST, Gaithersburg, MD, United States, John Michalowski, The National Institute of Standards and Technology, Gaithersburg, MD, United States*

**2:48pm A Digital Twin Concept for Manufacturing Systems**

Technical Paper Publication. IMECE2018-87737

*Wesley Ellgass, Kennesaw State University, Kennesaw, GA, United States, Ali Vatankhah-Barenji, Guangdong University of Technology, Guangzhou, China, Hector S. Lemus, Nathan Holt, Kennesaw State University, Kennesaw, GA, United States, Julian Richmond, Kennesaw State University, Marietta, GA, United States, Germanico Gonzalez-Badillo, Universidad Autonoma De San Luis Potosi, Rioverde San Luis Potosi, Mexico*

**3:09pm Digital Twin using Siemens PLCs and PLM software: A manufacturing material system case study**

Technical Presentation. IMECE2018-87772

*David Guerra-Zubiaga, Steven Moser, Michael Fyfe, Kennesaw State University, Marietta, GA, United States, Sebastien Desarzens, Donato Laurent, Fribourg University, Fribourg, Select State/Province, Switzerland*

## **2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING**

### **2-2-3 Congress-Wide Symposium on Additive Manufacturing: Metals - Powder Bed Fusion I**

**Third Floor, David L. Lawrence Convention Center, Room 301 3:45pm - 5:30pm**

Session Chair: **Scott Thompson**, *Auburn University, Auburn, AL, United States*

Session Co-Chair: **Nima Shamsaei**, *Auburn University, Auburn, AL, United States*

**3:45pm Utilizing Advanced Manufacturing Technologies to Develop a Reconfigurable Lumbar Puncture Training Model**

Technical Paper Publication. IMECE2018-86851

*Besim Kalajdzic, University of Windsor, Windsor, ON, Canada, Ruth Jill Urbanic, University of Windsor, La Salle, ON, Canada, Andre Khayat, Anna Farias, University of Windsor, Windsor, ON, Canada*

**4:00pm Post-Process Analysis in Metal Additive Manufacturing by Micro-CT**

Technical Paper Publication. IMECE2018-87897

*Subin Shrestha, Thomas Starr, Kevin Chou, University of Louisville, Louisville, KY, United States*

**4:27pm Comparison of Louvered Plate-Fin Heat Exchangers Made via Additive Manufacturing**

Technical Paper Publication. IMECE2018-87941

*Michael Bichnevicius, David Saltzman, The Pennsylvania State University, University Park, PA, United States, Stephen Lynch, Penn State University, University Park, PA, United States*

**4:48pm Optimize Additive Manufacturing Post-Build Heat Treatment and Hot Iso-Static Pressing Process Using an Integrated Computational Materials Engineering Framework**

Technical Paper Publication. IMECE2018-88550

*Anahita Imanian, Kelvin Leung, Nagaraja Iyyer, Technical Data Analysis, Falls Church, VA, United States, Derek H. Warner, Peipei Li, Cornell University, Civil and Environmental Engineering, Ithaca, NY, United States*

**5:09pm Modeling Mechanical Performance of Additively Manufactured Structures with Uncertain Microstructures Using A Posteriori Material-Model Error Estimation Techniques**

Technical Presentation. IMECE2018-89255

*Judith A. Brown, Joseph Bishop, Sandia National Laboratories, Albuquerque, NM, United States*

## 2-5 MANUFACTURING OF ATOMICALLY-THIN, TWO-DIMENSIONAL MATERIALS

### 2-5-3 Synthesis and Processing of 2D Materials

Third Floor, David L. Lawrence Convention Center,  
Room 304 3:45pm - 5:30pm

Session Chair: **Pilgyu Kang**, *George Mason University, Fairfax, VA, United States*

Session Co-Chair: **SungWoo Nam**, *University of Illinois, Urbana-Champaign (UIUC), 4418 Mechanical Engineering Lab, IL, United States*, **Mike Cai Wang**, *University of South Florida, Tampa, FL, United States*

#### 3:45pm Electrochemical Polishing of Large Area Two-Dimensional Materials Grown by Physical Vapor Transport

Technical Presentation. IMECE2018-89854

**Amritanand Sebastian**, *Pennsylvania State University, UNIVERSITY PARK, PA, United States*, **Akhil Dodda**, *Pennsylvania State University, State college, PA, United States*, **Daniel Schulman**, *Penn State University, UNIVERSITY PARK, PA, United States*, **Saptarshi Das**, *Pennsylvania State University, State college, PA, United States*

#### 4:06pm Strengthening and Toughening of Thin Metal Leaves by Graphene Synthesis

Technical Presentation. IMECE2018-89512

**Kaihao Zhang**, *University of Illinois at Urbana Champaign, Urbana, IL, United States*, **Sameh Toufick**, *University of Illinois Urbana Champaign, Urbana, IL, United States*

#### 4:27pm Roll-to-roll Plasma Chemical Vapor Deposition for Scalable Nanomanufacturing of Graphene

Technical Presentation. IMECE2018-86382

**Majed Alrefae**, *Purdue University, West Lafayette, IN, United States*, **Timothy Fisher**, *UCLA, Los Angeles, CA, United States*

#### 4:48pm Large-scale Dynamic Energy Driven Assembly of Two-Dimensional Layered Materials on polymer substrate

Technical Presentation. IMECE2018-88881

**Dong Zhou**, **Bo Li**, *Villanova University, Villanova, PA, United States*

#### 5:09pm Analysis of multilayered copper/nickel/titanium deposited aluminum alloys using electrochemical process

Technical Presentation. IMECE2018-88889

**Mohammad Asaduzzaman Chowdhury**, *Dhaka University of Engng & Tech, Gazipur, Gazipur, Bangladesh*, **Bengir Ahmed Shuvho**, *Dhaka University of Engineering & Technology, Dhaka, Bangladesh*, **Uttam Kumar Debnath**, **Rajib Nandee**, *Dhaka University of Engineering and Technology, Gazipur, Gazipur, Bangladesh*, **Suman Das**, *University of Saskatchewan, Saskatchewan, SK, Canada*, **Mohi Uddin Ahmed**, *Dhaka University of Engineering & Technology, Gazipur, Bangladesh*, **Atiqur Rahman**, *Bangladesh Road Transport Authority (BRTA), Dhaka, Bangladesh*

## 2-13 ROBOTICS & AUTOMATION IN ADVANCED MANUFACTURING

### 2-13-3 Algorithms and Optimization

Third Floor, David L. Lawrence Convention Center,  
Room 302 3:45pm - 5:30pm

Session Chair: **Daniel Cox**, *Georgia Southern University, Statesboro, GA, United States*

Session Co-Chair: **Andrzej Nycz**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

#### 3:45pm Efficient Feedrate Optimization Method for Spline Toolpath With Curvature-Base Planning and Accurate Interpolating

Technical Paper Publication. IMECE2018-86162

**Yong Zhang**, **Mingyong Zhao**, **Peiqing Ye**, *Tsinghua, Beijing, Select State/Province, China*, **Jiali Jiang**, *China University of Mining & Technology, Beijing, Select State/Province, China*, **Hui Zhang**, *Tsinghua, Beijing, Select State/Province, China*

#### 4:06pm Adaptive Industrial Robots Using Machine Vision

Technical Paper Publication. IMECE2018-86720

**Vladimir Kuts**, **Tauno Otto**, **Toivo Tähemaa**, **Khuldoon Bukhari**, **Tengiz Pataraiia**, *Tallinn University of Technology, Tallinn, Harju, Estonia*

#### 4:27pm A Collision-free Motion Planning Approach for Parallel Manipulator Assembly based on Machine Vision

Technical Presentation. IMECE2018-88784

**Haodong Chen**, *Hefei University of Technology, Hefei, China*, **Zheng Guo**, *Shanghai Jiao Tong University, Shanghai, China*, **Yifan Wang**, **Ping Zhao**, *Hefei University of Technology, Hefei, China*

#### 4:48pm Graphically Manipulating Procedurally Generated G-Code

Technical Presentation. IMECE2018-89740

**Steven Patrick**, *Oak Ridge National Laboratory, Knoxville, TN, United States*, **Andrzej Nycz**, **Mark W. Noakes**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

#### 5:09pm Control of Continuous Polymer Compounding Fuse Filament Modeling

Technical Paper Publication. IMECE2018-87114

**Connor Armstrong**, **Thomas Carlacci**, **David Bigio**, *University of Maryland, College Park, MD, United States*

## 2-14 LASER-BASED ADVANCED MANUFACTURING AND MATERIALS PROCESSING

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### 2-14-2 Laser-Matter interaction and its applications in materials processing

Third Floor, David L. Lawrence Convention Center, Room 305 3:45pm - 5:30pm

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Session Chair: **Leila Ladani**, *University of Texas at Arlington, Arlington, TX, United States*

Session Co-Chair: **Sriharsha Srinivas Sundarram**, *Fairfield University, Fairfield, CT, United States*

#### 3:45pm Multi-Physics Modeling of Laser Interaction With Surface in Powder Bed Melting Process

Technical Paper Publication. IMECE2018-86566

**Faiyaz Ahsan**, *University of Texas at Arlington, Arlington, TX, United States*, **Jafar Razmi**, *University of Texas at Arlington, Fort Worth, TX, United States*, **Leila Ladani**, *University of Texas at Arlington, Arlington, TX, United States*

#### 4:06pm Laser Triggered Alloying of Al-Shell/Ni-Core Energetic Nanoparticle: A Molecular Dynamics Study

Technical Paper Publication. IMECE2018-86942

**Pengfei Ji**, **Mengzhe He**, **Yiming Rong**, *Southern University of Science and Technology, Shenzhen, Guangdong, China*, **Yuwen Zhang**, *University Of Missouri, Columbia, MO, United States*, **Yong Tang**, *South China University of Technology, Guangzhou, Guangdong, China*

#### 4:27pm Simulation and Characterization of 3D Sharp Optical Fiber Sensors Fabricated by Femtosecond Laser

Technical Presentation. IMECE2018-88130

**Seunghwan Jo**, **Hang-Eun Joe**, **Anmol Guram**, **Martin Jun**, *Purdue University, West Lafayette, IN, United States*

#### 4:48pm Laser Foaming of Polyetherimide (PEI)

Technical Paper Publication. IMECE2018-88623

**Sriharsha Srinivas Sundarram**, **Venkateshwarlu Kakumanu**, *Fairfield University, Fairfield, CT, United States*

#### 5:09pm Synthesis of Molybdenum-Doped TiO<sub>2</sub> by Laser Ablation in Precursor Solution

Technical Presentation. IMECE2018-89687

**Mustafa Mozael**, *Rutgers university, New Brunswick, NJ, United States*, **Stephen Tse**, *Rutgers University, Piscataway, NJ, United States*, **Bernard Kear**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

## 2-15 DIGITAL MANUFACTURING SIMULATION AND VALIDATION

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### 2-15-3 Digital Manufacturing in Industry 4.0 aspects

Third Floor, David L. Lawrence Convention Center, Room 303 3:45pm - 5:30pm

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Session Chair: **Kai He**, *Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China*

Session Co-Chair: **Germanico Gonzalez-Badillo**, *Universidad Autonoma De San Luis Potosi, Rioverde San Luis Potosi, Mexico*, **David Guerra-Zubiaga**, *Kennesaw State University, Marietta, GA, United States*

#### 3:45pm Digital Factory: Simulation Enhancing Production and Engineering Process

Technical Paper Publication. IMECE2018-88334

**Angella Thomas**, **John Cohran III**, **David Guerra-Zubiaga**, *Kennesaw State University, Marietta, GA, United States*

#### 4:06pm A Novel Modeling Approach for Solving the Cell Formation Problem

Technical Paper Publication. IMECE2018-88128

**Taras Dmytryshyn**, **Mohamed Ismail**, *University of Regina, Regina, SK, Canada*, **Ola Rashwan**, *Penn State University, Middletown, PA, United States*

#### 4:27pm Research on the integrated optimization for path planning of transfer robots and production scheduling of flexible job shops

Technical Presentation. IMECE2018-86759

**Xixin Li**, *Hubei University of Technology, Wuhan, Hubei, China*, **Baigang Du**, *Wuhan University of Technology, Wuhan, Hubei, China*

#### 4:48pm Internet of Things in Manufacturing: An Overview

Technical Paper Publication. IMECE2018-88262

**Hussam Alothman**, *BU, Johnston City, NY, United States*, **Mohammad Khasawneh**, *BU, Binghamton, NY, United States*, **Nagen Nagarur**, *Binghamton University, Binghamton, NY, United States*

#### 5:09pm AI Based Monitoring and Control of Injection Molding Process for Consistent Product Quality

Technical Presentation. IMECE2018-89531

**Hong Seok Park**, **Saurabh Kumar**, *University of Ulsan, Ulsan, Korea (Republic)*

**THURSDAY, NOVEMBER, 15**

**2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE  
MANUFACTURING**

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**2-2-4 Congress-Wide Symposium on Additive Manufacturing: Metals - Powder Bed Fusion II**

**Third Floor, David L. Lawrence Convention Center,  
Room 301 8:55am - 10:40am**

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Session Chair: **Scott Thompson**, Auburn University, Auburn, AL, United States

Session Co-Chair: **Nima Shamsaei**, Auburn University, Auburn, AL, United States, **Albert To**, University of Pittsburgh, Pittsburgh, PA, United States

**8:55am Mitigating Near-Surface Porosity in a Laser Powder Bed Fusion Process**

**Invited Presentation.** IMECE2018-89768

**Sneha Prabha Narra**, Worcester Polytechnic Institute, Worcester, MA, United States, **Luke Scime**, Carnegie Mellon University, Pittsburgh, PA, United States, **Jack Beuth**, Carnegie Mellon Univ, Pittsburgh, PA, United States

**9:37am Efficient Optimization of Build Orientation and Support Structure Design for Laser Powder Bed Additive Manufacturing**

**Technical Presentation.** IMECE2018-89493

**Albert To**, **Lin Cheng**, **Qian Chen**, **Xuan Liao**, University of Pittsburgh, Pittsburgh, PA, United States

**9:58am Microstructure Development after Thermal Cycling by Adjacent Melt Pools in Ti-B Alloys**

**Technical Presentation.** IMECE2018-89786

**Yining He**, Carnegie Mellon University, Pittsburgh, PA, United States, **Jack Beuth**, Carnegie Mellon Univ, Pittsburgh, PA, United States, **Bryan Webler**, **Nicholas Jones**, Carnegie Mellon University, Pittsburgh, PA, United States

**10:19am Alloy Composition and Processing Changes to Mitigate Melt Pool Balling Defects in Direct Metal Additive Manufacturing**

**Technical Presentation.** IMECE2018-89988

**Jack Beuth**, Carnegie Mellon Univ, Pittsburgh, PA, United States, **Debomita Basu**, **Zachary Francis**, **Nicholas Jones**, **Bryan Webler**, Carnegie Mellon University, Pittsburgh, PA, United States

**2-4 NANOMANUFACTURING**

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**2-4-1 Nanomanufacturing: Spray or print deposition techniques for nanomaterials and nanostructures**

**Third Floor, David L. Lawrence Convention Center,  
Room 304 8:55am - 10:40am**

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Session Chair: **Matt Maschmann**, University of Missouri, Columbia, MO, United States

Session Co-Chair: **Chih-Hao Chang**, North Carolina State University, Raleigh, NC, United States

**8:55am Harnessing the Versatility of Carbon Nanotubes as Printed Thin Films**

**Technical Presentation.** IMECE2018-86495

**Aaron Franklin**, Duke University, Durham, NC, United States

**9:16am Obtaining Thickness-Limited Electro Spray Deposition for 3D Coating**

**Technical Presentation.** IMECE2018-88299

**Lin Lei**, Rutgers University, Piscataway, NJ, United States, **Dylan Kovacevich**, Rutgers University, Belle Mead, NJ, United States, **Michael P. Nitzsche**, Rutgers University, Piscataway, NJ, United States, **Jihyun Ryu**, Drexel University, Piscataway, NJ, United States, **Kutaiba Al-Marzoki**, Rutgers University, Piscataway, NJ, United States, **Gabriela Rodriguez**, City University of New York, Bronx, NY, United States, **Lisa C. Klein**, Rutgers University, Piscataway, NJ, United States, **Andrei Jitianu**, City University of New York, Bronx, NY, United States, **Jonathan Singer**, Rutgers University, Piscataway, NJ, United States

**9:37am Geometric Effects on 3D Coating by Self-Limiting Electro spray**

**Technical Presentation.** IMECE2018-89649

**Dylan Kovacevich**, Rutgers University, Belle Mead, NJ, United States, **Lin Lei**, **Jonathan Singer**, Rutgers University, Piscataway, NJ, United States

**9:58am Modeling Electro sprays: Millions of Charged Drops Evaporating, Fissioning, and Depositing on a Substrate**

**Technical Presentation.** IMECE2018-89841

**Marriner Merrill**, US Naval Research Laboratory, Washington, DC, United States

**2-6 ADVANCED MACHINING AND FINISHING**

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**2-6-3 Assisted Machining Techniques**

**Third Floor, David L. Lawrence Convention Center,  
Room 305 8:55am - 10:40am**

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Session Chair: **Sathish Kannan**, AMERICAN UNIVERSITY OF SHARJAH, SHARJAH, United Arab Emir.

Session Co-Chair: **Chang Ye**, University of Akron, Peninsula, OH, United States

**8:55am A Numerical Study to Investigate the Influence of Edge Preparation in Vibration Assisted Machining**

**Technical Paper Publication.** IMECE2018-87731

**Salman Pervaiz**, Rochester Institute of Technology - Dubai, Dubai, Dubai, United Arab Emir., **Sathish Kannan**, AMERICAN UNIVERSITY OF SHARJAH, SHARJAH, United Arab Emir., **Wael Samad**, Rochester Institute of Technology - Dubai Campus, Dubai, United Arab Emir.

**9:16am Improving the fretting and corrosion fatigue strength of 300M ultra-high strength steel using the ultrasonic surface rolling process**

**Technical Presentation.** IMECE2018-89765

**Weidong Zhao**, University of akron, AKRON, OH, United States, **Chang Ye**, University of Akron, Peninsula, OH, United States, **Daoxin Liu**, **Xiaohua Zhang**, Northwestern Polytechnical University, Xian, Shaanxi, China, **Ruixia Zhang**, The University of Akron, Akron, OH, United States, **Hao Zhang**, University of akron, Akron, OH, United States, **Ying Zhou**, INSA Rennes, Rennes, Bretagne, France

**9:37am** Enhanced plasticity for metallic glasses by electropulsing-assisted surface severe plastic deformation  
**Technical Presentation.** IMECE2018-89780

*Chi Ma, University of Akron, Akron, OH, United States, Sergey Suslov, Qatar Environment and Energy Research Institute, Doha, Qatar, Chang Ye, University of Akron, Peninsula, OH, United States, Yalin Dong, The University of Akron, Akron, OH, United States*

**9:58am** The Effects of Electrically-assisted Ultrasonic Nanocrystal Surface Modification On 3D-printed Ti-6Al-4V Alloy  
**Technical Presentation.** IMECE2018-89788

*Hao Zhang, Jingyi Zhao, University of Akron, Akron, OH, United States, Jun Liu, The University of Akron, Akron, OH, United States, Haifeng Qin, University of Akron, Akron, OH, United States, Zhencheng Ren, The University of Akron, Akron, OH, United States, Gary Doll, University of Akron, Akron, OH, United States, Yalin Dong, The University of Akron, Akron, OH, United States, Chang Ye, University of Akron, Peninsula, OH, United States*

**10:19am** Measuring Points Selection for Laser Tracker Measurement of Five-Axis Machine Tool  
**Technical Paper Publication.** IMECE2018-88314

*Qingzhao Li, University of Electronic Science and Technology of China, Chengdu, China, Wei Wang, Hai Li, University Electronic Science Technology of China, Chengdu, China, Jing Zhang, Zhong Jiang, University of Electronic Science and Technology of China, ChengDu, Select State/Province, China*

## 2-8 ADVANCED MATERIAL FORMING

**2-8-1 Novel processes**

**Third Floor, David L. Lawrence Convention Center, Room 302 8:55am - 10:40am**

Session Chair: **William Emblom**, *University Of Louisiana-Lafayette, Lafayette, LA, United States*

Session Co-Chair: **Ihab Ragai**, *Penn State University, The Behrend College, Erie, PA, United States*

**8:55am** Friction Stir Back Extrusion: Preliminary Investigations on Through-Wall Characteristics for AL-1100-O  
**Technical Paper Publication.** IMECE2018-86318

*William Emblom, University Of Louisiana-Lafayette, Lafayette, LA, United States, Austin Menard, UL Lafayette, Lafayette, LA, United States, Clarissa Gallardo, Univ of Louisiana at Lafayette, Lafayette, LA, United States, Clayton Loehn, Louisiana State University, Baton Rouge, LA, United States, Ayotunde Olayinka, UL Lafayette, LFAYETTE, LA, United States, Scott Wagner, Michigan Tech, Atlantic Mine, MI, United States, Muhammad Wahab, Louisiana State University, Baton Rouge, LA, United States, Daniel Seguin, Michinga Technological University, Houghton, MI, United States*

**9:16am** Effect of Process Parameters on the Electrically-Assisted Sintered Iron-Copper Powder Metals  
**Technical Paper Publication.** IMECE2018-86891

*Ihab Ragai, Matt Schwabenbauer, Penn State University, The Behrend College, Erie, PA, United States, Seray Eser, Michael Müller, Rosenheim University of Applied Sciences, Rosenheim, Germany*

**9:37am** Mechanical Response and Grain Size Effects in Microscale Reverse Extrusion of Copper  
**Technical Presentation.** IMECE2018-87996

*Bin Zhang, Yooseob Song, George Voyiadjis, Wen Meng, Louisiana State University, Baton Rouge, LA, United States, Kristian Juul, Technical University of Denmark, Lyngby, Denmark, Kim L. Nielsen, Technical University of Denmark, Kgs. Lyngby, Denmark*

**9:58am** Electroplasticity Behavior Of Mg AZ31B Subjected To Electropulsing Assisted Tension  
**Technical Presentation.** IMECE2018-89819

*Chang Ye, University of Akron, Peninsula, OH, United States, Zhencheng Ren, The University of Akron, Akron, OH, United States, Jingyi Zhao, University of Akron, Akron, OH, United States, Jun Liu, The University of Akron, Akron, OH, United States, Hao Zhang, University of Akron, Akron, OH, United States, Yalin Dong, The University of Akron, Akron, OH, United States*

**10:19am** A Numerical Study on Rotational Tube Flaring Process  
**Technical Paper Publication.** IMECE2018-86918

*Chetan Nikhare, The Pennsylvania State University, Erie, PA, United States*

## 2-11 COMPUTATIONAL MODELING AND SIMULATION FOR ADVANCED MANUFACTURING

**2-11-1 Advanced Manufacturing Processes-Modeling and Simulation I**

**Third Floor, David L. Lawrence Convention Center, Room 302 8:55am - 10:40am**

Session Chair: **Virginia DeGiorgi**, *Naval Research Lab, Washington, DC, United States*

Session Co-Chair: **Yucheng Liu**, *Mississippi State University, Mississippi State, MS, United States*

**8:55am** Prediction of Residual Stress and Damage in Thermal Spray Coatings Using Hybrid Computational Approach  
**Technical Paper Publication.** IMECE2018-86504

*Abba Abubakar, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, Abul Fazal M. Arif, King Fahd Univ of Petroleum & Minerals (KFUPM), Dhahran, Saudi Arabia, Khaled Al-Athel, King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia, Syed Sohail Akhtar, Department of Mechanical Engineering, King Fahad University of Petroleum & Miner, Dhahran, Saudi Arabia*

**9:16am** Three-Dimensional Computational Modeling of Microstructure Defects in Thermal Barrier Coatings  
**Technical Presentation.** IMECE2018-88983

*Stephanie Wimmer, Naval Research Laboratory, Washington, DC, United States, Virginia DeGiorgi, Naval Research Lab, Washington, DC, United States, John Drazin, ASEE, Washington, DC, United States, Edward Gorzkowski, Naval Research Laboratory, Washington, DC, United States*

**9:37am** Modeling and Experimental Verification of Torque and Thrust Forces Generated by the Conventional Drill's Chisel Edge

Technical Paper Publication. IMECE2018-86155

**Charbel Seif**, American University Of Beirut, Beirut, Lebanon, **Ilige Hage**, Notre Dame University-Louaize, Zouk Mosbeh, Lebanon, **Ramsey Hamade**, American University Of Beirut, Beirut, Riad El Solh, Lebanon

**9:58am** Statistically Validated and Optimized Tabu Search Estimation of Cutting Tool Life in Turning

Technical Paper Publication. IMECE2018-86232

**Remi Hage**, **Ilige Hage**, **Chady Ghnatios**, Notre Dame University-Louaize, Zouk Mosbeh, Lebanon, **Ramsey Hamade**, American University Of Beirut, Beirut, Riad El Solh, Lebanon

**10:19am** Flexible Fiber Motion in Fiber-Reinforced Composite Material Processing

Technical Paper Publication. IMECE2018-86440

**Diwei Zhang**, Prairie View A&M University, CYPRESS, TX, United States, **Xiaobo Peng**, **Dongdong Zhang**, Prairie View A&M University, Prairie View, TX, United States

## 2-12 VARIATION SIMULATION AND DESIGN FOR ASSEMBLY

### 2-12-1 Variation Simulation and Design for Assembly I

**Fourth Floor, David L. Lawrence Convention Center, Room 402 8:55am - 10:40am**

Session Chair: **Kristina Wärmefjord**, Chalmers University of Technology, Gothenburg, Sweden

Session Co-Chair: **Hua Wang**, Shanghai Jiao Tong University, Shanghai, OO, China

**8:55am** Geometry Assurance In A Digitally Connected Environment

Technical Presentation. IMECE2018-89239

**Rikard Söderberg**, Chalmers University of Technology, Gothenburg, Sweden

**9:37am** Part Variation Simulations: An Industrial Case Study With an Experimental Validation

Technical Paper Publication. IMECE2018-87329

**Narendra Akhadkar**, Schneider Electric Industries SAS, Grenoble, France, **Silvestre Cano**, Schneider Electric, Apodaca, Mexico, **Alain Van Hoecke**, **Jean Marie MALDJIAN**, **Christophe Gourru**, Schneider Electric Industries SAS, Grenoble, France

**9:58am** Convex optimization techniques as applied to simulation of compliant assembly

Technical Presentation. IMECE2018-88963

**Maria Stefanova**, Peter the Great St.Petersburg Polytechnic University (SPbPU), St. Petersburg, Select State/Province, Russia, **Boris Grigoriev**, Peter the Great St.Petersburg Polytechnic University (SPbPU), Saint Petersburg, Russia, **Margarita Petukhova**, Peter the Great St.Petersburg Polytechnic University (SPbPU), St. Petersburg, Select State/Province, Russia, **Sergey Lupuleac**, St.Petersburg Polytechnic University, Saint Petersburg, Russia, **Stanislav Baklanov**, **Olga Minewitsch**, Peter the Great St.Petersburg Polytechnic University (SPbPU), Saint Petersburg, Russia

**10:19am** Tolerance Allocation With Simulation-Based Digital Twin for CFRP-Metal Countersunk Bolt Joint

Technical Paper Publication. IMECE2018-86645

**Hua Wang**, **Mengqian Zhou**, Shanghai Jiao Tong University, Shanghai, OO, China, **Bo Liu**, Chongqing Changan Automobile Co., LTD, Oushang Automobile Institute, Chongqing, China

## 2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING

### 2-2-5 Congress-Wide Symposium on Additive Manufacturing: Polymers I

**Third Floor, David L. Lawrence Convention Center, Room 301 10:50am - 12:35pm**

Session Chair: **Mehran Tehrani**, University of New Mexico, Albuquerque, NM, United States

Session Co-Chair: **Junghoon Yeom**, Michigan State University, East Lansing, MI, United States, **Heather Lai**, Suny New Paltz, New Paltz, NY, United States

**10:50am** Direct and Converse Piezoelectric Behavior of Three-Dimensionally Printed Polymer Without Filler or Poling

Technical Presentation. IMECE2018-86014

**Patatri Chakraborty**, University at Buffalo, SUNY, Buffalo, NY, United States, **Chi Zhou**, University At Buffalo, Buffalo, NY, United States, **Deborah D.L. Chung**, Univ At Buffalo, State Univ of NY, Buffalo, NY, United States

**11:11am** In-Plane Molecular Alignment in 3D-printed Polymers due to Printing-Process-Induced Shear Stress

Technical Presentation. IMECE2018-86015

**Patatri Chakraborty**, **Naga B. Gundrati**, University at Buffalo, SUNY, Buffalo, NY, United States, **Chi Zhou**, University At Buffalo, Buffalo, NY, United States, **Chong Cheng**, University at Buffalo, SUNY, Buffalo, NY, United States, **Deborah D.L. Chung**, Univ At Buffalo, State Univ of NY, Buffalo, NY, United States

**11:32am** Influence of the Weak Interfaces On the Fracture Toughness of 3D Printed Polymers

Technical Presentation. IMECE2018-86508

**L. Roy Xu**, **Mehran Tehrani**, University of New Mexico, Albuquerque, NM, United States

**11:53am** Effect of Process Parameters on Compressive Properties of ULTEM 9085 Produced by FDM Process

Technical Paper Publication. IMECE2018-87523

**Aboma Wagari Gebisa**, **Hirpa G. Lemu**, University of Stavanger, stavanger, Rogaland, Norway

**12:14pm** Fully Resolved Simulations of Additive Manufacturing Processes

Technical Presentation. IMECE2018-87850

**Gretar Tryggvason**, **Huanxiong Xia**, **Jiacai Lu**, Johns Hopkins University, Baltimore, MD, United States

## 2-4 NANOMANUFACTURING

### 2-4-2 Nanomanufacturing: Nanomaterials Synthesis and Assembly

Third Floor, David L. Lawrence Convention Center,  
Room 304 10:50am - 12:35pm

Session Chair: **Dimitry Papkov**, *University of Nebraska-Lincoln, Lincoln, NE, United States*

Session Co-Chair: **Matt Maschmann**, *University of Missouri, Columbia, MO, United States*

#### 10:50am Numerical Investigation of Internal Forces During Carbon Nanotube Forest Self-Assembly

Technical Paper Publication. IMECE2018-86567

**Taher Hajilounezhad**, *University of Missouri-Columbia, Columbia, MO, United States*, **Matt Maschmann**, *University of Missouri, Columbia, MO, United States*

#### 11:11am Stochastic growth of tall carbon nanotube forest using rapid thermal chemical vapor deposition

Technical Presentation. IMECE2018-87644

**Jaegeun Lee**, **Moataz Abdulhafez**, **Mostafa Bedewy**, *University of Pittsburgh, Pittsburgh, PA, United States*

#### 11:32am 3D Carbon Nanotube Microstructures from Multi-Stage Chemical Vapor Deposition

Technical Presentation. IMECE2018-87840

**Ryan Hines**, **Matt Maschmann**, *University of Missouri, Columbia, MO, United States*, **Cole Love-Baker**, *University of South Carolina, Columbia, SC, United States*

#### 11:53am Focused Laser Dewetting of Gold Nanofilms and Laser Induced Localized Physical Vapor Deposition

Technical Presentation. IMECE2018-88208

**Jonathan Singer**, **Tiaxing Ma**, *Rutgers University, Piscataway, NJ, United States*

#### 12:14pm 3D Compatible Sacrificial Nanoimprint Lithography for Tuning the Wettability of Thermoplastic Materials

Technical Presentation. IMECE2018-89823

**Molla Hasan**, **Jonathan Singer**, **Imrhan Khan Shahjahan**, *Rutgers University, Piscataway, NJ, United States*

## 2-6 ADVANCED MACHINING AND FINISHING

### 2-6-4 Nontraditional Machining Processes

Third Floor, David L. Lawrence Convention Center,  
Room 305 10:50am - 12:35pm

Session Chair: **Guha Manogharan**, *Penn State University, University Park, PA, United States*

Session Co-Chair: **Yang Guo**, *Michigan State University, East Lansing, MI, United States*

#### 10:50am A Comparison of the Effects of Wire Electrical Discharge Machining Parameters on the Processing of Traditionally Manufactured and Additively Manufactured 316L Stainless Steel Specimens

Technical Paper Publication. IMECE2018-88014

**Gregory Bicknell**, *Pennsylvania State University, State College, PA, United States*, **Guha Prasanna Manogharan**, *Pennsylvania State University, Boardman, OH, United States*

#### 11:11am Experimental Study on Machining of Hybrid Composite Stacks Using Submerged Abrasive Water-jet Machining Process

Technical Paper Publication. IMECE2018-88179

**Sagil James**, **Mayur Sunil Narkhede**, *California State University Fullerton, Fullerton, CA, United States*

#### 11:32am Methodology for the Control of the Volume of Material Removal in the Plateau Honing Process

Technical Presentation. IMECE2018-88745

**Milton Fabian Coba-Salcedo**, *Universidad del Atlantico, Barranquilla, Colombia*, **Irene Buj-Corral**, **Joan Vivancos-Calvet**, *Universitat Politècnica de Catalunya, Barcelona, Spain*

#### 11:53am Estimation of Machine Vision parameters of Surface roughness and Wire wear in Wire EDM of Al-8%Si3N4 Metal Matrix Composite Material using Artificial Neural Network

Technical Presentation. IMECE2018-89478

**GURUPAVAN H R**, *P.E.S COLLEGE OF ENGINEERING, MANDYA, India*, **Ravindra Holalu Venkatadas**, *P E S College of Engineering, Mandya, Karnataka, India*, **Devegowda T M**, *P.E.S COLLEGE OF ENGINEERING, MANDYA, Select State/Province, India*

#### 12:14pm Geometric tolerances evaluation in hydrostatic rotary table

Technical Presentation. IMECE2018-88986

**Jun Zha**, **Hangcheng Zhang**, **Yipeng Li**, **Yaolong Chen**, *Xi'an Jiaotong University, Xi'an, China*

## 2-8 ADVANCED MATERIAL FORMING

### 2-8-2 Formability-I

Third Floor, David L. Lawrence Convention Center,  
Room 302 10:50am - 12:35pm

Session Chair: **Chetan Nikhare**, *The Pennsylvania State University, Erie, PA, United States*

Session Co-Chair: **William Emblom**, *University Of Louisiana-Lafayette, Lafayette, LA, United States*

#### 10:50am Technology Development and Tool Concepts for High-Temperature Forming of Titanium

Technical Paper Publication. IMECE2018-86660

**Frank Schieck**, *Fraunhofer Inst For Machine Tools & Forming Tech IWU, Chemnitz, Germany*, **Dirk Landgrebe**, **Matthias Demmler**, **Andre Albert**, *Fraunhofer IWU, Chemnitz, Germany*, **Martin Weber**, *Fraunhofer IST, Braunschweig, Germany*

**11:11am**                    **The Effect of Local Force Control on Punch Forces During Panel Forming**  
**Technical Paper Publication.** IMECE2018-86030  
*William Embloom, University Of Louisiana-Lafayette, Lafayette, LA, United States*

**11:32am**                    **Tube Buckling: An Advantage to Tube Shaping**  
**Technical Paper Publication.** IMECE2018-86910  
*Chetan Nikhare, The Pennsylvania State University, Erie, PA, United States*

**11:53am**                    **Determination of Thermal Parameters of a Work-Roll in Warm Rolling Using Inverse Modeling**  
**Technical Paper Publication.** IMECE2018-86106  
*Vinod Yadav, North Eastern Regional Institute of Science & Technology, Nirjuli, Arunachal Pradesh, India*

**12:14pm**                    **Effect of Pre-Bending on Formability of DQ Steel and Al 5182**  
**Technical Paper Publication.** IMECE2018-87321  
*Shabbir Memon, Wichita State University, Wichita, KS, United States, Hamid Lankarani, Obaidur rahman Mohammed, Wichita State University, Wichita, KS, United States*

## **2-11 COMPUTATIONAL MODELING AND SIMULATION FOR ADVANCED MANUFACTURING**

### **2-11-2 Advanced Manufacturing Processes-Modeling and Simulation II**

**Third Floor, David L. Lawrence Convention Center Room 303    10:50am - 12:35pm**

Session Chair: **Muhammad Jahan**, *Miami University, Oxford, OH, United States*  
Session Co-Chair: **Yucheng Liu**, *Mississippi State University, Mississippi State, MS, United States*

**10:50am**                    **Finite Element Simulation of Backward Micro Extrusion for Annealed Copper**  
**Technical Paper Publication.** IMECE2018-86755  
*Md Mosleh Uddin, Debabrata Mondal, Paul D. Herrington, University of New Orleans, New Orleans, LA, United States*

**11:11am**                    **Effect of Size Distribution on Optical Absorption During Intense Pulsed Light Sintering of Metal Nanoparticles**  
**Technical Paper Publication.** IMECE2018-87038  
*Harish Devaraj, Hyun-Jun Hwang, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Rajiv Malhotra, Rutgers University, Piscataway, NJ, United States*

**11:32am**                    **Numerical Modeling of a Pure Water Jet Machining of Ti-6Al-4V and Al 6061-T6 Using ABAQUS and Smoothed Particle Hydrodynamics**  
**Technical Paper Publication.** IMECE2018-87271  
*Greg Pasken, Jianfeng MA, Mark McQuilling, Saint Louis University, Saint Louis, MO, United States, Muhammad Jahan, Miami University, Oxford, OH, United States*

**11:53am**                    **FEM Investigation of Phase Transformation in Vibration Assisted Nano Impact Machining by Loose Abrasives (VANILA)**  
**Technical Paper Publication.** IMECE2018-87274  
*Nick Duong, Jianfeng MA, Saint Louis University, Saint Louis, MO, United States, Muhammad Jahan, Miami University, Oxford, OH, United States, Shuting Lei, Kansas State Univ, Manhattan, KS, United States, Murali Sundaram, University of Cincinnati, Cincinnati, OH, United States*

**12:14pm**                    **Cohesive zone modelling for transfer printing of thin films**  
**Technical Presentation.** IMECE2018-89426  
*Shruti Jain, UT Austin, Austin, TX, United States, Roger Bonnecaze, The University of Texas at Austin, Austin, TX, United States, Kenneth Liechti, Univ Of Texas, Austin, TX, United States*

## **2-12 VARIATION SIMULATION AND DESIGN FOR ASSEMBLY**

### **2-12-2 Variation Simulation and Design for Assembly II**

**Fourth Floor, David L. Lawrence Convention Center, Room 402    10:50am - 12:35pm**

Session Chair: **Hua Wang**, *Shanghai Jiao Tong University, Shanghai, OO, China*  
Session Co-Chair: **Kristina Wärmefjord**, *Chalmers University of Technology, Gothenburg, Sweden*

### **2-12-2-2 Geometrical Variation Simulation of Spot-Welded Assemblies**

**Technical Paper Publication.** IMECE2018-87454  
*Samuel Lorin, Fraunhofer Chalmers Centre, Gothenburg, Sweden, Björn Lindau, Chalmers University of Technology, Göteborg, Sweden, Roham Sadeghi Tabar, Chalmers University of Technology, Gothenburg, Sweden, Lars Lindkvist, Chalmers Univ Of Tech, Se-41296 Goteborg, Sweden, Kristina Wärmefjord, Rikard Söderberg, Chalmers University of Technology, Gothenburg, Sweden*

**11:11am**                    **Simulation and Optimization of Airframe Assembly Process**  
**Technical Paper Publication.** IMECE2018-87058

*Sergey Lupuleac, St.Petersburg Polytechnic University, Saint Petersburg, Russia, Nadezhda Zaitseva, Maria Stefanova, Sergey Berezin, Peter the Great St.Petersburg Polytechnic University (SPbPU), St. Petersburg, Russia, Julia Shinder, Peter the Great St.Petersburg Polytechnic University (SPbPU), Saint Petersburg, N/A, Russia, Margarita Petukhova, Peter the Great St.Petersburg Polytechnic University (SPbPU), St. Petersburg, Select State/Province, Russia, Elodie Bonhomme, Airbus SAS, Toulouse, France*

**11:32am**                    **Influence of Selective Laser Heat Treatment Pattern Position on Geometrical Variation**  
**Technical Paper Publication.** IMECE2018-86164  
*Vaishak Ramesh Sagar, Kristina Wärmefjord, Rikard Söderberg, Chalmers University of Technology, Gothenburg, Vastra Gotland, Sweden*

**11:53am** CAD-Based Tolerance Analysis in Preliminary Design Stages Enabling Early Tolerance Evaluation

Technical Paper Publication. IMECE2018-86396

*Stefan Goetz, Engineering Design, Friedrich-Alexander-University Erlangen-Nürnberg, Erlangen, Germany, Benjamin Schleich, Sandro Wartzack, Engineering Design Friedrich-Alexander-University Erlangen-Nürnberg, Erlangen, Germany*

**12:14pm** Compliant Variation Analysis for High-Speed Train With Consideration of Welding Distortion

Technical Paper Publication. IMECE2018-86619

*Tao Liu, Shanghai Jiao Tong University, Shanghai, China, Yongjun Li, Baowang Li, CRRRC Tangshan Co., Ltd., tangshan, China, Zhimin Li, Limin Yao, Sun Jin, Shanghai Jiao Tong University, Shanghai, China*

## **2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING**

**2-2-6 Congress-Wide Symposium on Additive Manufacturing: Polymers II**

**Third Floor, David L. Lawrence Convention Center, Room 301 2:05pm - 3:50pm**

Session Chair: **Mehran Tehrani**, *University of New Mexico, Albuquerque, NM, United States*

Session Co-Chair: **Deborah D.L. Chung**, *Univ At Buffalo, State Univ of NY, Buffalo, NY, United States*

**2:05pm** Optimization of Design Process of Fused Filament Fabrication (FFF) 3D Printing

Technical Paper Publication. IMECE2018-87916

*Jaeyoon Kim, West Virginia University, Morgantown, WV, United States, Bruce Kang, West Virginia Univ, Morgantown, WV, United States*

**2:26pm** Mechanical Behavior of Octahedral and Octet Structures Produced From CLIP Technology

Technical Paper Publication. IMECE2018-88192

*Anil Saigal, Tufts University, Medford, MA, United States, Gian Calise, Tufts University, Cranston, RI, United States*

**2:47pm** "Flexible Strain Sensor Using Additive Manufacturing and Conductive Liquid Metal: Design, Fabrication, and Characterization"

Technical Paper Publication. IMECE2018-88753

*Austin Smith, Hamzeh Bardaweel, Louisiana Tech University, Ruston, LA, United States*

**3:08pm** Novel Ink for Ambient Condition Printing of Liquid Crystal Elastomers for 4D Printing

Technical Presentation. IMECE2018-88768

*Devin Roach, Devin J. Roach, H. Jerry Qi, Craig Hamel, Georgia Institute of Technology, Atlanta, GA, United States*

**3:29pm** Rapid Multi-material 3D Printing with Projection Micro-Stereolithography Using an Enclosed Printing Chamber and a Pump

Technical Presentation. IMECE2018-89396

*Daehoon Han, Howon Lee, Rutgers University, Piscataway, NJ, United States*

## **2-4 NANOMANUFACTURING**

**2-4-3 Nanomanufacturing: Integration of nanoscale materials or textures for enhanced performance**

**Third Floor, David L. Lawrence Convention Center, Room 304 2:05pm - 3:50pm**

Session Chair: **Chih-Hao Chang**, *North Carolina State University, Raleigh, NC, United States*

Session Co-Chair: **Dimitry Papkov**, *University of Nebraska-Lincoln, Lincoln, NE, United States*

**2:05pm** Advanced Nanomanufacturing and Hard-Soft Materials Integration for Smart and Connected Bioelectronics Technical Presentation. IMECE2018-86294

*Woon-Hong Yeo, Yun-Soung Kim, Georgia Institute of Technology, Atlanta, GA, United States*

**2:26pm** Regenerated Silk Fibroin Films with Reduced  $\beta$ -sheet Content by Microwave Processing and Carbon Nanotube Incorporation

Technical Presentation. IMECE2018-87653

*Se Youn Cho, Moataz Abdulhafez, Mostafa Bedewy, University of Pittsburgh, Pittsburgh, PA, United States*

**2:47pm** Systematic Analysis of Pattern Precision and Uniformity in Roll-to-Roll Colloidal Assembly System

Technical Presentation. IMECE2018-86895

*I-Te Chen, Elizabeth Schappell, Xiaolong Zhang, Chih-Hao Chang, North Carolina State University, Raleigh, NC, United States*

**3:00pm** Modification of Structure and Mechanical Behavior of Continuous Nanofibers through Addition of Small Amounts of Nano-inclusions

Technical Presentation. IMECE2018-89822

*Dimitry Papkov, University of Nebraska-Lincoln, Lincoln, NE, United States, Mohammad N. Andalib, University of Nebraska - Lincoln, Lincoln, NE, United States, Yuris Dzenis, Univ Of Nebraska, Lincoln, NE, United States*

## **2-6 ADVANCED MACHINING AND FINISHING**

**2-6-5 Machinability of Engineering Materials**

**Third Floor, David L. Lawrence Convention Center, Room 305 2:05pm - 3:50pm**

Session Chair: **Sathish Kannan**, *AMERICAN UNIVERSITY OF SHARJAH, SHARJAH, United Arab Emir.*

Session Co-Chair: **Derek Yip-Hoi**, *Western Washington University, Bellingham, WA, United States*

**2:05pm** Effect of Rake Angle and Feed Rate on the Surface Quality While Turning In Situ TiB<sub>2</sub>/7050 Al Metal Matrix Composites

Technical Paper Publication. IMECE2018-87399

*Kunyang Lin, Northwestern Polytechnical University, Xian, Shaanxi, China, Wenhui Wang, Ruisong Jiang, Northwestern Polytechnical University, Xi'an, Shaanxi, China, Yifeng Xiong, Northwestern Polytechnical University, Xi'an, China*

**2:26pm** An Experimental Investigation of Inclined Hole Drilling for CFRP Under Various Lubrication Techniques  
Technical Paper Publication. IMECE2018-87550

**Sathish Kannan**, AMERICAN UNIVERSITY OF SHARJAH, SHARJAH, United Arab Emir., **Salman Pervaiz**, Rochester Institute of Technology - Dubai, Dubai, United Arab Emir., **Abhishek Ghoshal**, Rochester Institute of Technology - Dubai Campus, Dubai, Dubai, United Arab Emir.

**2:47pm** Investigation and Modeling of Flag Generation in Honeycomb Sandwich Panel Machining  
Technical Paper Publication. IMECE2018-87706

**Derek Yip-Hoi**, **David Gill**, Western Washington University, Bellingham, WA, United States

**3:08pm** Delamination area prediction during milling carbon fiber reinforced polymer composites based on fiber cutting process geometry simulation software  
Technical Presentation. IMECE2018-87851

**Xingyu Fu**, **Kyeongun Song**, Purdue University, West Lafayette, IN, United States, **Gyuhoo Kim**, **Byung-Kwon Min**, Yonsei University, Seoul, Korea (Republic), **Martin Jun**, Purdue University, West Lafayette, IN, United States

**3:29pm** Comparative Assessment of Delamination control techniques in Machining of CFRP  
Technical Presentation. IMECE2018-88901

**Kamlesh Phapale**, Bharat Forge Ltd., Pune, Maharashtra, India

## 2-7 THIRD SYMPOSIUM ON FASTENING AND JOINING TECHNOLOGY

2-7-2 Welding Performance Evaluation and Simulation

Fourth Floor, David L. Lawrence Convention Center, Room 401 **2:05pm - 3:50pm**

Session Chair: **Thomas Whitney**, University of Dayton, Dayton, OH, United States

Session Co-Chair: **Sayed Nassar**, Oakland University, Rochester, MI, United States

**2:05pm** Numerical Investigation on the effect of pin-tool rotational speed on the Coulomb and the Modified Coulomb Friction Model of Friction-Stir-Welding (FSW)  
Technical Presentation. IMECE2018-86673

**Saad Aziz**, Louisiana State University, Baton Rouge, LA, United States, **Washim Dewan**, DUET, Gazipur, Dhaka, Bangladesh, **Daniel Huggett**, LSU, Ponchatoula, LA, United States, **Muhammad Wahab**, **Ayman Okeil**, **Warren Liao**, Louisiana State University, Baton Rouge, LA, United States

**2:26pm** Improvement of Joint Integrity in MIG Welded Steel: A Review  
Technical Paper Publication. IMECE2018-86788

**Timothy Odiaka**, **Nkosinathi Madushele**, **Stephen Akinlabi**, University of Johannesburg, Johannesburg, Gauteng, South Africa

**2:47pm** Estimation and Comparison of Welding Performances Using MRA and GMDH in P-GMAW for SS 316L Material  
Technical Paper Publication. IMECE2018-88604

**Rudreshi Addamani**, P.E.S COLLEGE OF ENGINEERING, MANDYA, Select State/Province, India, **Ravindra Holalu Venkatadas**, P E S College of Engineering, Mandya, Karnataka, India, **Ugrasen Gonchikar**, BMSC College of Engineering, Bangalore, Karnataka, India, **Chethan Y D**, M I T Mysuru, Karnataka, MANDYA, India

**3:08pm** Mathematical Model to Predict Tensile Strength of Underwater Friction Stir Welded (UFSW) on 5052 Aluminium Alloys  
Technical Paper Publication. IMECE2018-88610

**Srinivasa Rao Pedapati**, Universiti Teknologi PETRONAS, Perak Darul Ridzuan, Perak, Malaysia, **Dhanis Paramaguru**, Universiti Teknologi PETRONAS, Seri Iskandar, Malaysia, **Mokhtar Awang**, **Hamed Mohebbi**, Universiti Teknologi PETRONAS, Seri Iskandar, Perak, Select State/Province, Malaysia

**3:29pm** Improving the Heat Dissipation From a Pressure Wheel of a Laser Robotic End-of-Arm Tooling Using Different Geometrical Designs and Materials  
Technical Paper Publication. IMECE2018-86880

**Abdallah Hamieh**, Lawrence Technological University, Southfield, MI, United States, **Badih Jawad**, Lawrence Technological University, Dearborn Heights, MI, United States, **Liping Liu**, Lawrence Technological University, Southfield, MI, United States, **Vernon Fernandez**, Lawrence Technological Univ, Southfield, MI, United States, **Mike Kheirallah**, Advanced Safety and Energy, Flint, MI, United States

2-8 ADVANCED MATERIAL FORMING

2-8-3 Formability-II

Third Floor, David L. Lawrence Convention Center, Room 302 **2:05pm - 3:50pm**

Session Chair: **Chetan Nikhare**, The Pennsylvania State University, Erie, PA, United States

Session Co-Chair: **Scott Wagner**, Michigan Tech, Atlantic Mine, MI, United States

**2:05pm** A New Incremental Bending System to Form Curved Metal Plate by Experiment and Finite Element Simulation  
Technical Paper Publication. IMECE2018-86800

**Xiaobing Dang**, The Chinese University of Hong Kong, Hong Kong, Hong Kong, **Kai He**, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China, **Feifei Zhang**, Shenzhen Institutes of Advanced Technology, Shenzhen, P.R.China, China, **Qiyang Zuo**, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China, **Ruxu Du**, Chinese University Of Hong Kong, Hong Kong, Hong Kong

**2:26pm** Utilization of Wavy Toolpath in Single-Point Incremental Forming  
Technical Paper Publication. IMECE2018-86885

**Tyler Grimm**, **Ihab Ragai**, **John Roth**, Penn State University, The Behrend College, Erie, PA, United States

**2:47pm** Development of Processing Map for Superplastic Deformation of Ti-6Al-4V Alloy

Technical Paper Publication. IMECE2018-88631

**Abdul Wahed Mohd, Amit Kumar Gupta, Nitin Kotkunde,** BITS Pilani Hyderabad Campus, Hyderabad, Telangana, India, **Swadesh Kumar Singh,** GRIET, Hyderabad, India

**3:08pm** Effect of Preform During Low Pressure Tube Hydroforming

Technical Paper Publication. IMECE2018-86090

**Ashley Trott, Chetan Nihare,** The Pennsylvania State University, Erie, PA, United States

## **2-9 INNOVATIVE PRODUCT DESIGN**

### **2-9-1 Innovative Product Design I**

**Fourth Floor, David L. Lawrence Convention Center, Room 402 2:05pm - 3:50pm**

Session Chair: **Ricardo Jardim-Goncalves,** Universidade Nova De Lisboa - Faculdade De Ciencias E Tecnologia, Caparica, OO, Portugal

Session Co-Chair: **Siddharthsinh Jadeja,** Aditya Silver Oak Institute of Technology, Rajkot Gujarat, India

**2:05pm** The Design and Study of the Tensioned Whole Coupling

Technical Paper Publication. IMECE2018-86458

**yaohui li, a'ni luo, heping liu,** Harbin Engineering University, Harbin, China

**2:26pm** Improve Enterprise Resource Management Through the Usage of IoT in the Shopfloor

Technical Paper Publication. IMECE2018-87589

**Adriana Cunha,** TecMinho/University of Minho, Guimarães, Portugal, **Joao Silva,** Universidade do Minho, Guimaraes 4800-058, Portugal

**2:47pm** Design of Damped Structures to Increase Machine Tool Dynamical Performance

Technical Paper Publication. IMECE2018-87912

**Francesco Aggogeri, Nicola Pellegrini,** DIMI - University of Brescia, Brescia, Lombardia, Italy, **Angelo Merlo,** CeSI, Cologno Monzese (MI), Italy, **Alberto Borboni, Riccardo Adamini, Claudio Taesi,** DIMI - University of Brescia, Brescia, Lombardia, Italy

**3:08pm** A Future Trend in Sensing Enterprise Systems

Technical Paper Publication. IMECE2018-88530

**Majid Zamiri, Andreia Artifice, Elsa Marcelino-Jesus,** UNINOVA, Caparica, Portugal, **Joao Sarraipa,** UNINOVA - DEE/FCT/UNL, Caparica, OO, Portugal, **Ricardo Jardim-Goncalves,** Universidade Nova De Lisboa - Faculdade De Ciencias E Tecnologia, Caparica, OO, Portugal

**3:29pm** Improve Product Profitability While Accelerating Time to Market

Technical Presentation. IMECE2018-88732

**Stephanie Feraday,** aPriori, Concord, MA, United States

## **2-11 COMPUTATIONAL MODELING AND SIMULATION FOR ADVANCED MANUFACTURING**

### **2-11-3 Advanced Manufacturing Processes-Modeling and Simulation III**

**Third Floor, David L. Lawrence Convention Center, Room 303 2:05pm - 3:50pm**

Session Chair: **Jose Teixeira,** University of Minho, Guimaraes, Portugal

Session Co-Chair: **Yucheng Liu,** Mississippi State University, Mississippi State, MS, United States

**2:05pm** A Study on Evolution of Splat Radius and Temperature in Thermal Spray Process

Technical Paper Publication. IMECE2018-87303

**Manpreet Dash,** IIT Kharagpur, Kharagpur, West Bengal, India, **Sangharsh Kumar, Partha P. Bandyopadhyay,** Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India, **Anandaroop Bhattacharya,** IIT Kharagpur, Kharagpur, West Bengal, India

**2:26pm** A Numerical Study of Solder Paste Rolling Process for PCB Printing

Technical Paper Publication. IMECE2018-88035

**Ricardo Oliveira, Nelson Rodrigues, Jose Teixeira,** University of Minho, Guimaraes, Select State/Province, Portugal, **Duarte Santos,** Bosch Car Multimedia SA, Braga, Select State/Province, Portugal, **Delfim Soares,** University of Minho, Guimaraes, Select State/Province, Portugal, **Maria Cerqueira,** Physics Department, Braga, Portugal, **Sonmriha Teixeira,** University of Minho, Guimaraes, Select State/Province, Portugal

**2:47pm** Numerical and Experimental Characterization of Kerf Formation in Abrasive Waterjet Machining

Technical Paper Publication. IMECE2018-88617

**Joseck Nyaporo Nyaboro,** Egypt-Japan University of Science and Technology, New Borg Al Arab, Egypt, **Mahmoud Ahmed,** Assiut University, Assiut, Egypt, **Hassan El-Hofy,** Egypt-Japan University of Science and Technology, New Borg Al Arab, Select State/Province, Egypt, **Mohamed El-Hofy,** Advanced Manufacturing Research Centre with Boeing, The University of Sheffield, Willis Way, Rotherm, United Kingdom

**3:08pm** Multiphysics Modeling and Parametric Analysis of an Inductor for Heating Thin Sheet Materials

Technical Paper Publication. IMECE2018-88676

**Alex Mazursky,** Miami University, Oxford, OH, United States, **Hee-Chang Park,** Korea Institute of Machinery and Materials, Daejeon, Korea (Republic), **Sung-Hyuk Song,** Korea Institute of Machinery & Materials, Daejeon, Korea (Republic), **Jeong-Hoi Koo,** Miami University, Oxford, OH, United States

**3:29pm** Backpropagation artificial neural network method for the prediction of nanostructured waspaloy under cryogenic and hot deformation

Technical Presentation. IMECE2018-88918

**Harrison Onovo, David Esezobor, Muideen Bodude, Adeyanju Sosimi,** University of Lagos, Lagos, Nigeria

## **2-2 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING**

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### **2-2-7 Congress-Wide Symposium on Additive Manufacturing: Composites/Ceramics & Bio-Applications**

**Third Floor, David L. Lawrence Convention Center, Room 301 4:00pm - 5:45pm**

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Session Chair: **Mehran Tehrani**, *University of New Mexico, Albuquerque, NM, United States*

Session Co-Chair: **Gretar Tryggvason**, *Johns Hopkins University, Baltimore, MD, United States*, **Scott Thompson**, *Auburn University, Auburn, AL, United States*

#### **4:00pm Dynamic Behavior of Biologically Inspired 3D Printed Visco-Elastic Heterogeneous Structures**

Technical Paper Publication. IMECE2018-87845

**Heather Lai, Jennifer Beahan**, *Suny New Paltz, New Paltz, NY, United States*

#### **4:21pm Additively Manufactured, Design Optimized Composites for Lightweighting**

Technical Presentation. IMECE2018-88037

**Nekoda Van De Werken, Pouria Khanbolouki**, *University of New Mexico, Albuquerque, NM, United States*, **Chitrang Patel, Ali Tamijani**, *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*, **Mehran Tehrani**, *University of New Mexico, Albuquerque, NM, United States*

#### **4:42pm Direct Ink Writing of Graphene Oxide Reinforced PDMS Matrix Composites for Improved Mechanical Properties**

Technical Paper Publication. IMECE2018-88052

**Chao Liu, Junjun Ding**, *Alfred University, Alfred, NY, United States*, **Li Jiang**, *Tuskegee University, Tuskegee, AL, United States*

#### **5:03pm Conformal 3D Printing of Tire Tread using Ground Tire Rubber (GTR) Composites**

Technical Presentation. IMECE2018-89615

**FAEZ ALKADI, Jae-Won Choi**, *THE UNIVERSITY OF AKRON, AKRON, OH, United States*

#### **5:24pm Optimizing Process Parameters To Binder Jet Ceramics**

Technical Presentation. IMECE2018-89844

**Edgar Mendoza, Daming Ding, B. Reeja-Jayan**, *CARNEGIE MELLON UNIVERSITY, Pittsburgh, PA, United States*, **Jack Beuth**, *Carnegie Mellon Univ, Pittsburgh, PA, United States*

## **2-6 ADVANCED MACHINING AND FINISHING**

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### **2-6-6 Cutting Tool Performance and Treatment**

**Third Floor, David L. Lawrence Convention Center, Room 305 4:00pm - 5:45pm**

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Session Chair: **Muhammad Jahan**, *Miami University, Oxford, OH, United States*

Session Co-Chair: **Ihab Ragai**, *Penn State University, The Behrend College, Erie, PA, United States*

#### **4:00pm Studies on Cryogenic Treated Drills Under Nano-Fluid Based Reduced Quantity Lubrication Conditions for Machining Ti6Al4V**

Technical Paper Publication. IMECE2018-86941

**D SAMUEL RAJ, Aarthi Kumaran, Jerome Arul Praveen.C**, *ANNA UNIVERSITY, CHENNAI, TAMIL NADU, India*

#### **4:21pm Acoustic Signal Analysis for Prediction of Flank Wear During Conventional Milling**

Technical Paper Publication. IMECE2018-86886

**Travis Roney, Anthony Bauccio, Derek Shaffer, Paige Lorton, Ihab Ragai, David Loker**, *Penn State University, The Behrend College, Erie, PA, United States*, **Chetan Nihare**, *The Pennsylvania State University, Erie, PA, United States*

#### **4:42pm Investigating the Effect of Tool Coating on Cutting Forces and Tool Wear During Micro-Milling of Polycarbonate Glass**

Technical Paper Publication. IMECE2018-87441

**Craig Hanson**, *Miami University, Oxford, OH, United States*, **Xingbang Chen**, *Saint Louis University, St. Louis, MO, United States*, **Muhammad Jahan**, *Miami University, Oxford, OH, United States*, **Jianfeng MA**, *Saint Louis University, Saint Louis, MO, United States*, **Gregory K Arbuckle**, *Western Kentucky University, Bowling Green, KY, United States*

#### **5:03pm "Experimental Investigation of Speed, Feed and Step-Over on Cutting Forces, Cutting Time, and Surface Roughness in the Pocket Machining of AISI P20 Using Spiral Tool Path"**

Technical Paper Publication. IMECE2018-87322

**Divyangkumar D. Patel**, *Shroff S R Rotary Institute of Chemical Technology, Ankleshwar, India*, **Devdas Lalwani**, *Sardar Vallabhbhai National Institute of Technology (SVNIT), 395007 Gujarat State, India*

#### **5:24pm Experimental and Theoretical Investigations on Tool Wear and Surface Quality in Micro Milling of SiCp/Al Composites Under Dry and MQL Conditions**

Technical Paper Publication. IMECE2018-86071

**Ben Deng, Hao Wei Wang, Fang Yu Peng, Rong Yan, Lin Zhou**, *Huazhong University of Science and Technology, Wuhan, China*

## **2-7 THIRD SYMPOSIUM ON FASTENING AND JOINING TECHNOLOGY**

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### **2-7-1 Bonded Joint and Bolted Joint Technologies**

**Third Floor, David L. Lawrence Convention Center, Room 304 4:00pm - 5:45pm**

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Session Chair: **Sayed Nassar**, *Oakland University, Rochester, MI, United States*

Session Co-Chair: **Thomas Whitney**, *University of Dayton, Dayton, OH, United States*

#### **4:00pm "The Effect of Temperature, Thickness, and Working Time on Adhesive Properties"**

Technical Paper Publication. IMECE2018-86737

**Nick Aerne, John P. Parmigiani**, *Oregon State University, Corvallis, OR, United States*

**4:21pm**      **Finite Element Analysis of the Load Factor and Design for Bolted T- shape Flange Joints Consisting of Dissimilar Clamped Parts**

**Technical Paper Publication.** IMECE2018-87335

*Shunichiro SAWA, HARDLOCK Industry Co.,Ltd, Tokyo, OO, Japan, Yasuhisa SEKIGUCHI, Graduate School of Engineering, Hiroshima University, Hiroshima, Japan, Toshiyuki Sawa, Hiroshima Univ, Koto-City, Japan*

**4:42pm**      **Use of Tailored Fiber Placement (TFP) to Reinforce Fastener Holes in Composites**

**Technical Presentation.** IMECE2018-87999

*Thomas Whitney, University of Dayton, Dayton, OH, United States, Gyaneshwar Tandon, Univ Of Dayton Research, Dayton, OH, United States*

**5:03pm**      **Frequency Effect of Torsion on Rotating Bending Fatigue Behavior of Gas Tungsten Arc (GTA) Welded AISI 1018 and AISI 4140 Welded Joints**

**Technical Paper Publication.** IMECE2018-88338

*Saad Aziz, Ahmet Eren, Muhammad Wahab, Louisiana State University, Baton Rouge, LA, United States*

## **2-8 ADVANCED MATERIAL FORMING**

### **2-8-4 Testing and Defects**

**Third Floor, David L. Lawrence Convention Center, Room 302      4:00pm - 5:45pm**

Session Chair: **Scott Wagner**, *Michigan Tech, Atlantic Mine, MI, United States*

Session Co-Chair: **Molla Hasan**, *Department of Mechanical and Aerospace Engineering Rutgers, Rutgers, NJ, United States*

**4:00pm**      **High-throughput fabrication and testing of metallic glass nanostructures**

**Technical Presentation.** IMECE2018-89835

*Molla Hasan, Rutgers University, Piscataway, NJ, United States, Golden Kumar, Texas Tech University, Lubbock, TX, United States*

**4:21pm**      **Novel Approach for Tension Testing Micro Tubes**

**Technical Paper Publication.** IMECE2018-87244

*Scott Wagner, Michigan Tech, Atlantic Mine, MI, United States, William Emblom, University Of Louisiana-Lafayette, Lafayette, LA, United States, Kevin M. Johnson, Kahaan P. Shah, Navrose Handa, Nihal Kapare, Michigan Technological University, Houghton, MI, United States*

**4:42pm**      **Experimental Analysis and Testing of the Hemming Process Types Utilized in the Automotive Industry**

**Technical Paper Publication.** IMECE2018-87232

*Pablo Alberto Limon Leyva, INSTITUTO TECNOLÓGICO DE SAN LUIS POTOSI, SAN LUIS POTOSI, Select State/Province, Mexico, Pedro De Jesus Garcia Zugasti, INSTITUTO TECNOLÓGICO DE SAN LUIS POTOSI, San Luis Potosi, SAN LUIS POTOSI, Mexico, Eder Hazael Govea Valladares, INSTITUTO TECNOLÓGICO DE SAN LUIS POTOSI, SAN LUIS POTOSI, Select State/Province, Mexico, Antonio de Jesus Balvantín García, University of Guanajuato, Salamanca, Guanajuato, Mexico, Jose Angel Diosdado De La Pena, Universidad De Guanajuato, Salamanca, Mexico, Isidro de Jesus Sanchez Arce, INSTITUTO TECNOLÓGICO DE SAN LUIS POTOSI, SAN LUIS POTOSI, Select State/Province, Mexico*

**5:03pm**      **Springback Analysis in Hybrid Material Deformation**

**Technical Paper Publication.** IMECE2018-86455

*Elizabeth Mamros, The Pennsylvania State University, The Behrend College, McMurray, PA, United States, Chetan Nikhare, The Pennsylvania State University, Erie, PA, United States*

**5:24pm**      **Simulation and Experiment Research on Squeeze Casting Combined With Forging of Automobile Control Arm**

**Technical Paper Publication.** IMECE2018-86006

*Liang Zhenglong, Zhang Qi, Xi'an Jiaotong University, Xi'an, China*

## **2-9 INNOVATIVE PRODUCT DESIGN**

### **2-9-2 Innovative Product Design II**

**Fourth Floor, David L. Lawrence Convention Center, Room 401      4:00pm - 5:45pm**

Session Chair: **Joao Silva**, *Universidade do Minho, Guimaraes 4800-058, Portugal*

Session Co-Chair: **Joao Sarraipa**, *UNINOVA - DEE/FCT/UNL, Caparica, OO, Portugal*

**4:00pm**      **A Mathematical Functional Decomposition Approach Through Granularity Partition Process in Quotient Space**

**Technical Paper Publication.** IMECE2018-86217

*Yu-Tong LI, China University of Petroleum, Qingdao, China, Yuxin Wang, China University of Petroleum, Huadong, Qingdao, Shandong, China*

**4:21pm**      **Visualisation and Detection of Road Traffic Events Using Complex Event Processing**

**Technical Paper Publication.** IMECE2018-87909

*Paulo Figueiras, Hugo Antunes, Guilherme Guerreiro, Ruben Costa, UNINOVA, Caparica, Select State/Province, Portugal, Ricardo Jardim-Goncalves, Universidade Nova De Lisboa - Faculdade De Cincias E Tecnologia, Caparica, OO, Portugal*

**4:42pm**      **“Monitoring, Risk Assessment and Actuation for Alzheimer Patients: A Case Study”**

**Technical Paper Publication.** IMECE2018-88166

*Fernando Luis-Ferreira, Joao Gao, Pedro Corista, Jorge Calado, UNINOVA, Caparica, Portugal, Joao Sarraipa, UNINOVA - DEE/FCT/UNL, Caparica, OO, Portugal*

5:03pm 3D printing of highly thermal insulated thermosets

Technical Presentation. IMECE2018-89539

*Biran Wang, Kristen Arias, Zimeng Zhang, Zhijian Pei, Texas A&M University, College Station, TX, United States, Shiren Wang, Texas A&M University, College Station 77843, TX, United States*

## 2-11 COMPUTATIONAL MODELING AND SIMULATION FOR ADVANCED MANUFACTURING

### 2-11-4 Advanced Manufacturing Processes-Modeling and Simulation V

Third Floor, David L. Lawrence Convention Center, Room 303 4:00pm - 5:45pm

Session Chair: **Tien-Chien Jen**, Univ Of Johannesburg, Johannesburg, South Africa

Session Co-Chair: **Yucheng Liu**, Mississippi State University, Mississippi State, MS, United States

### 4:00pm Randoms Subspace Identification in Modal Analysis of Port Crane

Technical Presentation. IMECE2018-86993

*xiuzhong xu, shanghai maritime university, shanghai, shanghai, China, Weidong Zhu, University of Maryland, Baltimore County, Baltimore, MD, United States, xu zhang, shanghai maritime university, shanghai, China*

### 4:21pm Feasibility Study of Condition Monitoring for Some Event Around the Crosshead in a Reciprocating Compressor

Technical Paper Publication. IMECE2018-87153

*Yoshifumi Mori, Tokuyama Corporation, Yamaguchi, Japan, Takashi Saito, Yamaguchi University, Ube / Yamaguchi, Japan, Yu Mizobe, Yamaguchi University, Ube City / Yamaguchi, Japan*

### 4:42pm The Mechanistic Process Comparison Between a Novel Slotted Injection Manifold Versus the Multiple Injection Manifold of a Low Pressure Square Type Atomic Layer Deposition Reactor

Technical Paper Publication. IMECE2018-86401

*Rigardt A.M. Coetzee, University of Johannesburg, Johannesburg, Gauteng, South Africa, Tien-Chien Jen, Univ Of Johannesburg, Johannesburg, South Africa*

### 5:03pm Generation Mechanism of Interfacial Residual Stress and its Effect on Mechanical Properties of Hybrid Fiber-Reinforced Thermoplastic Polymer (HFRT)

Technical Paper Publication. IMECE2018-86523

*Wan Cao, Ning Kang, Lingyu Sun, Shanshu Xiang, Xudong Yang, Yiben Zhang, Beihang University, Beijing, China*

### 5:24pm Analysis of Tool Position Error Induced Surface Topography Changes in Five-Axis Flank Milling

Technical Paper Publication. IMECE2018-86898

*Hao Si, Liping Wang, Tsinghua University, Beijing, Beijing, China*

## Advances in Aerospace Technology WEDNESDAY, NOVEMBER, 14

### 3-20 PLENARY

#### 3-20-1 Advances in Aerospace Technology Plenary I

Third Floor, David L. Lawrence Convention Center, Room 304 9:00am - 9:45am

#### 9:00am Rapid, Physics-Based Reduced Order Modeling of Nonlinear Aerodynamics

Plenary Presentation. IMECE2018-90092

*Marilyn Smith, Georgia Institute of Technology, Atlanta, GA, GA, United States*

### 3-1 GENERAL AEROSPACE

#### 3-1-1 General Aerospace

Third Floor, David L. Lawrence Convention Center, Room 308 10:00am - 11:45am

Session Chair: **Yingtao Liu**, University of Oklahoma, Norman, OK, United States

Session Co-Chair: **Caglar Oskay**, Vanderbilt University, Nashville, TN, United States

#### 10:00am Acoustic Based Non-Contact and Non-Destructive Evaluation for Detection of Damage Precursors in Composites

Technical Paper Publication. IMECE2018-86148

*Siqi Wang, Liangzhong Xiang, Yingtao Liu, Hong Liu, University of Oklahoma, Norman, OK, United States*

#### 10:21am "Fabrication, Optimization, and Characterization of PDMS/CNF Nanocomposite Sensor Arrays"

Technical Paper Publication. IMECE2018-86269

*Wenyuan Luo, Yingtao Liu, Mrinal Saha, University of Oklahoma, Norman, OK, United States, Steven Patterson, Thomas Robison, NNSA's National Security Campus operated by Honeywell, Kansas City, MO, United States*

#### 10:42am Design and Optimization of a Multi-purpose Urban Firefighting and Disaster Relief UAV

Technical Paper Publication. IMECE2018-86321

*Mohammed Mayeed, Kennesaw State University, Marietta, GA, United States*

#### 11:03am About the Immediate Shift From Large-Sized Machine Boeing 747 to Boeing 777

Technical Paper Publication. IMECE2018-86770

*MASAKO SHISHIDO, IWATE University, MORIOKA, Japan*

#### 11:24am EHS Primary Flight Controls Seals Wear Degradation Model

Technical Paper Publication. IMECE2018-87080

*Antonio C. Bertolino, Rocco Gentile, Giovanni Jacazio, Francesco Marino, Massimo Sorli, Politecnico Di Torino - Department of Mechanical and Aerospace Engineering, Torino, Italy*

### 3-18 CONGRESS-WIDE SYMPOSIUM ON NDE&SHM - STRUCTURAL HEALTH MONITORING OF AERO- SPACE VEHICLES

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#### 3-18-1 Congress-Wide Symposium on NDE&SHM - Structural Health Monitoring of Aerospace Vehi- cles

Third Floor, David L. Lawrence Convention Center,  
Room 307 10:00am - 11:45am

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Session Chair: **Yiska Goldfeld**, *Technion - Israel Institute of Tech-  
nology, Haifa, Israel*

Session Co-Chair: **Andrei Zagrai**, *New Mexico Institute of Mining  
& Technology, Socorro, NM, United States*

**10:00am** INTEGRATING THREE INSPECTION/  
MONITORING METHODS FOR AEROSPACE APPLICATIONS  
Technical Presentation. IMECE2018-87548

**Amir Nasrollahi**, *Piervincenzo Rizzo*, *University of Pittsburgh,  
Pittsburgh, PA, United States*

**10:21am** Hybrid Carbon based Textile Rein-  
forcement for Monitoring Water Infiltration

Technical Presentation. IMECE2018-89241

**Yiska Goldfeld**, **Gali Perry**, *Technion - Israel Institute of Tech-  
nology, Haifa, Israel*, **Gözdem Gözdem Dittel**, **Till Quadflieg**,  
**Thomas Gries**, *RWTH Aachen University, Aachen, Germany*

**10:42am** Disbond detection in a honeycomb  
composite plate using an ultrasonic method

Technical Presentation. IMECE2018-89310

**Ajit Mal**, *University Of California, Los Angeles CA, United States*,  
**Fei Gao**, **Lifu Wang**, **Steffen Tai**, **Leonardo Araque**, *University  
of California, Los Angeles, Los Angeles, CA, United States*, **Jing  
Lin**, *Beihang University, Beijing, Beijing, China*

**11:03am** Development of in Orbit Guided  
Wave Experiments

Technical Presentation. IMECE2018-89508

**John Sanchez**, *New Mexico Institute of Mining and Technology,  
Socorro, NM, United States*, **Andrei Zagrai**, *New Mexico Insti-  
tute of Mining & Technology, Socorro, NM, United States*

**11:24am** A Piezoelectric-Based Wireless Sen-  
sor for Monitoring Strain through Inductive Coupling

Technical Presentation. IMECE2018-89947

**Paul Ferri**, **Xiyue Zou**, *Rutgers University, Piscataway, NJ, Unit-  
ed States*, **Patrick V. Hull**, *NASA Marshall Space Flight Center,  
Huntsville, AL, United States*, **Aaron Mazzeo**, *Rutgers, The State  
University of New Jersey, Piscataway, NJ, United States*

### 3-4 ADVANCES IN AEROSPACE STRUCTURES AND MATERIALS

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#### 3-4-1 Advances in Aerospace Structures and Materials - 1

Third Floor, David L. Lawrence Convention Center,  
Room 308 1:45pm - 3:30pm

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Session Chair: **Dianyun Zhang**, *University of Connecticut, Storrs,  
CT, United States*

Session Co-Chair: **Xin Ning**, *The Pennsylvania State University,  
Urbana, IL, United States*

**1:45pm** The Effects of Layer-by-Layer Thickness and  
Fiber Volume Fraction Variation on the Mechanical Perform-  
ance of a Pressure Vessel

Technical Paper Publication. IMECE2018-86468

**Emre Öztaşlan**, **Volkan Coskun**, **Ali Yetgin**, **Bülent Acar**, **Tarik  
Olgar**, *Roketsan Inc., Ankara, Turkey*

**2:06pm** Recent Advancements in Spikes Used in Hy-  
personic Re-Entry Vehicles by Using CFD

Technical Paper Publication. IMECE2018-86550

**E L N ROHIT MADHUKAR**, *Koneru Lakshmaiah Educational  
Foundation, DURG, CHHATTISGARH, India*, **HARISH PANJA-  
GALA**, *Koneru Lakshmaiah Educational Foundation, Guntur,,  
Andhra Pradesh, India*

**2:27pm** Effect of Different Cutting Depths to the Cut-  
ting Forces and Machining Quality of CFRP Parts in Orthogo-  
nal Cutting: Numerical and Experimental Comparison

Technical Paper Publication. IMECE2018-87008

**Fard Man**, *Institut Clément Ader, Toulouse, Choose a State  
or Province, France*, **Emmanuel De-Luycker**, *Université de  
Toulouse, INP-ENIT, Tarbes, France*, **Frederic Lachaud**, **Yann  
Landon**, **Robert Piquet**, *Institut Clément Ader (ICA), Université  
de Toulouse, CNRS, INSA, ISAE-SUPAERO, Mines Albi, UPS,  
Toulouse, France*

**2:48pm** Development of Structural Neural Network  
Design Tool for Buckling Behaviour of Skin-Stringer Struc-  
tures Under Combined Compression and Shear Loading

Technical Paper Publication. IMECE2018-87970

**AYDIN OKUL**, *TAI - TURKISH AEROSPACE INDUSTRY, AN-  
KARA, Turkey*, **Ercan Gurses**, *Middle East Technical University,  
Ankara, Turkey*

**3:09pm** Determination of Johnson Cook Material  
Model Constants and Their Influence on Machining Simula-  
tions of Tungsten Heavy Alloy

Technical Paper Publication. IMECE2018-88270

**Kiran Sagar Chithajalu**, **Amrita Priyadarshini**, **Amit Kumar  
Gupta**, **Sidharth Kumar Shukla**, *BITS PILANI HYDERABAD  
CAMPUS, Hyderabad, Telengana, India*

### **3-12 PERIDYNAMICS MODELING**

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#### **3-12-1 Peridynamics Modeling - 1**

**Third Floor, David L. Lawrence Convention Center,  
Room 306 1:45pm - 3:30pm**

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Session Chair: **Erdogan Madenci**, *University Of Arizona, Tucson, AZ, United States*

Session Co-Chair: **Erkan Oterkus**, *University of Strathclyde, Glasgow, United Kingdom*

#### **1:45pm Peridynamic Modelling Using A Commercial Finite Element Software**

Technical Presentation. IMECE2018-86022

**Zhenghao Yang, Mingyang Li, Erkan Oterkus, Selda Oterkus**, *University of Strathclyde, Glasgow, United Kingdom*

#### **2:06pm Peridynamics/Digital Imaging Correlation for Tracking Crack Propagation Paths**

Technical Presentation. IMECE2018-89721

**Erdogan Madenci**, *University Of Arizona, Tucson, AZ, United States*, **Amin Yaghoobi, Atila Barut**, *Global Engineering Research and Technologies, Tucson, AZ, United States*, **Nam Phan**, *Naval Air Systems Command (NAVAIR), Patuxent River, MD, United States*

#### **2:27pm Peridynamic Modelling Of Fatigue Crack Growth In Welded Joints**

Technical Presentation. IMECE2018-89663

**Kyutack Hong, Selda Oterkus**, *University of Strathclyde, Glasgow, United Kingdom*

#### **2:48pm One Inclusion in the Infinite Peristatic Matrix**

Technical Paper Publication. IMECE2018-86519

**Valeriy Buryachenko**, *Micromechanics & Composites LLC, Dayton, OH, United States*

#### **3:09pm Fully Coupled Thermomechanical Peridynamic Analysis of Composite Structures**

Technical Presentation. IMECE2018-89547

**Yan Gao, Selda Oterkus**, *University of Strathclyde, Glasgow, United Kingdom*

### **3-19 CONGRESS-WIDE SYMPOSIUM ON NDE&SHM - NONDESTRUCTIVE EVALUATION AND STRUCTURAL HEALTH MONITORING OF COMPOSITE MATERIALS AND STRUCTURES**

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#### **3-19-1 Congress-Wide Symposium on NDE&SHM - Non-destructive Evaluation and Structural Health Monitoring of Composite Materials and Structures**

**Third Floor, David L. Lawrence Convention Center,  
Room 307 1:45pm - 3:30pm**

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Session Chair: **Francesco Lanza Di Scalea**, *University of California San Diego, La Jolla, CA, United States*

Session Co-Chair: **Yanfeng Shen**, *Shanghai Jiao Tong University, Shanghai, China*, **Andrei Zagrai**, *New Mexico Institute of Mining & Technology, Socorro, NM, United States*

#### **1:45pm Application of Interface Guided Waves for Inspection of Hybrid Bonded Joints: Semi Analytical Final Element Approach**

Technical Presentation. IMECE2018-86075

**Mark Jahanbin**, *Villanova University / Boeing Company, Mukilteo, WA, United States*, **Sridhar Santhanam**, *Villanova University, Collegeville, PA, United States*

#### **2:06pm Guided Wave Generation and Propagation in Self-Sensing Piezoelectric Composite Plates for Structural Health Monitoring**

Technical Paper Publication. IMECE2018-86229

**Junzhen Wang, Yanfeng Shen**, *Shanghai Jiao Tong University, Shanghai, China*

#### **2:27pm Advanced Structural Testing with Optical Metrology**

Technical Presentation. IMECE2018-87519

**Jack Irwin**, *Trillion Quality Systems, King of Prussia, PA, United States*

#### **2:48pm Guided Wave Techniques for Damage Detection in Composite Aerospace Structures**

Technical Presentation. IMECE2018-89370

**Francesco Lanza Di Scalea**, *University of California San Diego, La Jolla, CA, United States*, **Margherita Capriotti**, *UC San Diego, San Diego, CA, United States*, **Ranting Cui**, *University of California San Diego, San Diego, CA, United States*, **Antonino Spada**, *University of Palermo, Palermo, Italy*

### **3-2 ADVANCES IN AERODYNAMICS**

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#### **3-2-1 Advances in Aerodynamics**

**Third Floor, David L. Lawrence Convention Center,  
Room 307 3:45pm - 5:30pm**

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Session Chair: **Jose C. Pascoa**, *Universidade Da Beira Interior, Covilha 6200, Portugal*

Session Co-Chair: **MICHELE TRANCOSI**, *Sheffield Hallam University - ACES, Sheffield, Sheffield, United Kingdom*, **Jakson Augusto Leger Monteiro**, *University of Cape Verde, Praia, Cape Verde*

#### **3:45pm Solution to Optimize the Airfoils Shapes Placed Into a Supersonic Viscous Flow**

Technical Paper Publication. IMECE2018-86781

**Victorita Radulescu**, *University POLITEHNICA of Bucharest, Bucharest, Romania*

#### **4:06pm Investigations on Unsteady Flow Excitation and Mechanical Performance of Last Turbine Stage Long Blade Using Fluid-Structure Interaction Method**

Technical Paper Publication. IMECE2018-86950

**Jun Li, Zhigang Li**, *Institute of Turbomachinery, Xi'an Jiaotong Univ., Xi'an, Shaanxi, Shaanxi, China*, **LIMING SONG**, *Xian Jiaotong University, Xian, Shaanxi, China*, **Qinghua DENG**, *Xi'an Jiaotong University, Xi'an, China*

**4:27pm Effects of Harmonic Vibration on Cycloidal Rotor Performance**

**Technical Paper Publication.** IMECE2018-87103

*Jakson Augusto Leger Monteiro, University of Cape Verde, Praia, Cape Verde, Jose C. Pascoa, Universidade Da Beira Interior, Covilha 6200, Portugal*

**4:48pm CFD-Based Aerodynamic Analysis of the Flow Past an Airfoil With Passive Trapezoidal and Perforated Vortex Generators**

**Technical Paper Publication.** IMECE2018-87440

*Charbel Bou-Mosleh, Notre Dame University, Zouk Mosbeh, Lebanon, Rawad Himo, Notre Dame University-Louaize, Zouk Mosbeh, Select State/Province, Lebanon, Charbel Habchi, Notre Dame University - Louaize, ZOUK MOSBEH, Lebanon*

**5:09pm Experimental Analysis of Alternative Dielectric Materials for DBD Plasma Actuators**

**Technical Paper Publication.** IMECE2018-87455

*Frederico Rodrigues, University of Beira Interior, Covilha, Castelo Branco, Portugal, Jose C. Pascoa, Universidade Da Beira Interior, Covilha 6200, Portugal, Michele Trancossi, Sheffield Hallam University, Sheffield, United Kingdom*

**3-7 DYNAMIC BEHAVIOR OF COMPOSITES**

**3-7-1 Dynamic Behavior of Composites**

**Third Floor, David L. Lawrence Convention Center, Room 306 3:45pm - 5:30pm**

Session Chair: **Weiyi Lu**, *Michigan State University, East Lansing MI, United States*

Session Co-Chair: **Baoxing Xu**, *University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States*, **Meng Wang**, *University of California, San Diego, La Jolla, CA, United States*

**3:45pm Energy Capture Mechanism of Liquid Nanofoam for Blast Wave Mitigation**

**Technical Presentation.** IMECE2018-89404

*Weiyi Lu, Michigan State University, East Lansing, MI, United States*

**4:06pm Liquid Nanofoam System under Compression: Competition between Liquid Infiltration and Nanopore Deformation**

**Technical Presentation.** IMECE2018-89110

*Yue Zhang, University of Virginia, Charlottesville, VA, United States, Mingzhe Li, Michigan State University, East Lansing, MI, United States, Baoxing Xu, University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States, Weiyi Lu, Michigan State University, East Lansing, MI, United States*

**4:27pm Enhanced Interaction Between Filler And Tube Wall in Liquid Nanofoam-Filled Thin-Walled Tubes**

**Technical Presentation.** IMECE2018-89287

*Mingzhe Li, Junfeng Li, Michigan State University, East Lansing, MI, United States, Saeed Barbat, Ford Motor Company, Dearborn, MI, United States, Mohamed Ridha Baccouche, Ford, Ann Arbor, MI, United States, Weiyi Lu, Michigan State University, East Lansing, MI, United States*

**4:48pm Behavior of Lithium-ion Battery Pouch Cells under Dynamic Penetration**

**Technical Presentation.** IMECE2018-88858

*Meng Wang, University of California, San Diego, La Jolla, CA, United States*

**5:09pm Static and Dynamic Mechanical Behavior of Suspended Graphene/Silver NanoWire/Graphene (Gr/AgNW/Gr) Composite**

**Technical Presentation.** IMECE2018-89529

*Chenglin Wu, Chuanrui Guo, Yanxiao Li, Missouri University of Science and Technology, Rolla, MO, United States, David Veysset, MIT Dept. of Chemistry, Cambridge, MA, United States, Yuchen Sun, Steven E. Kooi, Keith A. Nelsom, Massachusetts Institute of Technology, Boston, MA, United States, Genda Chen, Missouri University of Science and Technology, Rolla, MO, United States*

**THURSDAY, NOVEMBER, 15**

**3-20 PLENARY**

**3-20-2 Advances in Aerospace Technology Plenary II**

**Third Floor, David L. Lawrence Convention Center, Room 305 8:00am - 8:45am**

**8:00am On the Flightpath to Adaptive Aerospace Structures: Artificial Telemetry**

**Plenary Presentation.** IMECE2018-90093

*George Lejeune, Pennsylvania State University, University Park, PA, United States*

**3-6 LIGHTWEIGHT SANDWICH COMPOSITES AND LAYERED STRUCTURES ? IN HONOR OF PROF. FROSTIG**

**3-6-1 Lightweight Sandwich Composites and Layered Structures - 1 (in Honor of Prof. Frostig)**

**Third Floor, David L. Lawrence Convention Center, Room 306 8:55am - 10:40am**

Session Chair: **Victor Birman**, *Missouri University of Science and Technology, St Louis, MO, United States*

Session Co-Chair: **George Kardomateas**, *Georgia Institute of Technology, Alpharetta, GA, United States*

**8:55am Structural Modelling of Reinforced Cement Composite under Uniaxial Loading**

**Technical Presentation.** IMECE2018-88960

*Yiska Goldfeld, Technion - Israel Institute of Technology, Haifa, Israel*

**9:10am Advanced Zig-Zag Beam Theories for Sandwich Structures Analyses**

**Technical Paper Publication.** IMECE2018-86783

*Matteo Filippi, Erasmo Carrera, Politecnico Di Torino, Torino, Italy*

**9:25am Higher-Order Shell Element for the Static and Free-Vibration Analysis of Sandwich Structures**  
Technical Paper Publication. IMECE2018-86784  
*Erasmus Carrera, Stefano Valvano, Matteo Filippi, Politecnico Di Torino, Torino, Italy*

**9:40am Nonlocal beam and plate models from three-dimensional stress gradient elasticity**  
Technical Presentation. IMECE2018-87739  
*Isaac Elishakoff, Florida Atlantic University, Boca Raton, FL, United States, Florian Hache, Florida Atlantic University, Moussy Le Neuf, France, Noel Challamel, University Bretagne Sud, Lorient, France*

**9:55am Optimization of the Composite Airplane Fuselage for an Optimum Structural Integrity**  
Technical Paper Publication. IMECE2018-88215  
*Athreya Nagesh, Penn State- Harrisburg, Middletown, PA, United States, Ola Rashwan, Penn State University, Middletown, PA, United States, Ma'moun Abu-Ayyad, Penn State Harrisburg, Middletown, PA, United States*

**10:10am Control of Fracture at the Interface of Dissimilar Materials using Randomly Oriented Inclusions and Fiber Networks**  
Technical Presentation. IMECE2018-88664  
*Victor Birman, Missouri University of Science and Technology, St Louis, MO, United States*

### **3-8 DYNAMICS AND CONTROL OF AEROSPACE STRUCTURES**

**3-8-1 Dynamics and Control of Aerospace Structures**

**Third Floor, David L. Lawrence Convention Center, Room 307 8:55am - 10:40am**

Session Chair: **Uttam Chakravarty**, *University of New Orleans, Kenner, LA, United States*  
Session Co-Chair: **Nikolaos Xiros**, *University of New Orleans, NAVAL ARCH & MARINE ENG, New Orleans, LA, United States*

**8:55am Active Vibration Control of a Helicopter Rotor Blade by Using a Linear Quadratic Regulator**  
Technical Paper Publication. IMECE2018-86319  
*Md Mosleh Uddin, Pratik Sarker, University of New Orleans, New Orleans, LA, United States, Colin R. Theodore, NASA Ames Research Center, Mountain View, CA, United States, Uttam Chakravarty, University of New Orleans, Kenner, LA, United States*

**9:10am A Comparative Study Between Selective Laser Melting and Electron Beam Additive Manufacturing Based on Thermal Modeling**  
Technical Paper Publication. IMECE2018-86428  
*M Shafiqur Rahman, University of New Orleans, New Orleans, LA, United States, Paul Schilling, Univ Of New Orleans, New Orleans, LA, United States, Paul D. Herrington, University of New Orleans, New Orleans, LA, United States, Uttam Chakravarty, University of New Orleans, Kenner, LA, United States*

**9:25am An Analysis of Harmonic Airloads Acting on Helicopter Rotor Blades**  
Technical Paper Publication. IMECE2018-86625  
*Iftekhar Alam Riyad, University of New Orleans, New Orleans, LA, United States, Uttam Chakravarty, University of New Orleans, Kenner, LA, United States*

**9:40am A Hybrid Energy Harvesting System Based on Solar Radiation and Mechanical Vibration**  
Technical Paper Publication. IMECE2018-86928  
*M Shafiqur Rahman, University of New Orleans, New Orleans, LA, United States, Uttam Chakravarty, University of New Orleans, Kenner, LA, United States*

**9:55am System Identification of Hydrokinetic Energy Harvester Using Flow Induced Oscillations**  
Technical Paper Publication. IMECE2018-87059  
*Ralph Saxton, Soumyadip Patra, University of New Orleans, New Orleans, LA, United States, Nikolaos Xiros, University of New Orleans, NAVAL ARCH & MARINE ENG, New Orleans, LA, United States, Michael Bernitsas, Univ Of Michigan, Ann Arbor, MI, United States, Hai Sun, University of Michigan, Ann Arbor, MI, United States*

**10:10am Characterizations of Diagnostic Properties and Detection Techniques of Fentanyl and Related Synthetic Opioids**  
Technical Paper Publication. IMECE2018-87803  
*M Shafiqur Rahman, University of New Orleans, New Orleans, LA, United States, Uttam Chakravarty, University of New Orleans, Kenner, LA, United States*

### **3-9 HIGH TEMPERATURE MATERIALS AND STRUCTURES**

**3-9-1 Materials and Structures at High Temperature and Extreme Conditions**

**Fourth Floor, David L. Lawrence Convention Center, Room 403 8:55am - 10:40am**

Session Chair: **Evan Pineda**, *NASA Glenn Research Center, Cleveland, OH, United States*  
Session Co-Chair: **Natasha Vermaak**, *Lehigh University, Bethlehem, PA, United States, Pavana Prabhakar, University of Wisconsin-Madison, Madison, WI, United States*

**8:55am Method of Fundamental Solution in Thermoelasticity of Random Structure Matrix Composites**  
Technical Paper Publication. IMECE2018-86515  
*Valeriy Buryachenko, Micromechanics & Composites LLC, Dayton, OH, United States*

**9:16am Optimization of Spatially Tailored Metal-Ceramic Composite Airframe in a High-Speed Environment**  
Technical Presentation. IMECE2018-87960  
*Phillip Deierling, The University of Iowa, Iowa City, IA, United States, Emily Dryer, The Ohio State University, Columbus, OH, United States, Olesya Zhupanska, University of Arizona, Tucson, AZ, United States*

**Draft Program**

**9:37am Microstructure Based Constitutive Model for Two-phase Superalloys**

Technical Presentation. IMECE2018-88358

**Masoud Ghorbani Moghaddam**, Medical College of Wisconsin, Milwaukee, WI, United States, **Ajit Achuthan**, Clarkson University, Potsdam, NY, United States, **Brett A. Bednarczyk**, **Steven Arnold**, **Evan Pineda**, NASA Glenn Research Center, Cleveland, OH, United States

**9:58am Effects of Microstructure on the Viscoplastic Response of Sea Ice**

Technical Presentation. IMECE2018-89408

**Shuvrangs Das**, **Pedro Ponte Castañeda**, university of pennsylvania, Philadelphia, PA, United States

**10:19am A Novel Methodology for Accurate Determination of Local Interphase Modulus Gradients in Model Nanocomposites**

Technical Presentation. IMECE2018-89667

**Pavan Kolluru**, Duke University, Durham, NC, United States, **Min Zhang**, Northwestern University, Evanston, IL, United States, **L. Catherine Brinson**, Duke University, Durham, NC, United States

**3-5 BEAM, PLATE, AND SHELL STRUCTURES**

**3-5-1 Beam, Plate, and Shell Structures**

**Fourth Floor, David L. Lawrence Convention Center, Room 403 10:50am - 12:35pm**

Session Chair: **Zahra Sotoudeh**, Cal Poly Pomona, Ontario, CA, United States

Session Co-Chair: **Xin-Lin Gao**, Southern Methodist University, Dallas, TX, United States

**10:50am Finite Element Modelling of TBC Failure Mechanisms by Using XFEM**

Technical Paper Publication. IMECE2018-86576

**Safa Mesut BOSTANCI**, ASELSAN A.S., Ankara, Turkey, **Ercan Gurses**, **Demirkan Coker**, Middle East Technical University, Ankara, Turkey

**11:11am Mixed One-/Two-Dimensional Models With Node Dependent Kinematic Capabilities for the Analysis of Metallic and Composite Structures**

Technical Paper Publication. IMECE2018-87490

**Enrico Zappino**, **Erasmus Carrera**, Politecnico Di Torino, Torino, Italy

**11:32am New Non-classical Kirchhoff Rod Model Incorporating the Microstructure Effect**

Technical Presentation. IMECE2018-89994

**Gongye Zhang**, **Xin-Lin Gao**, Southern Methodist University, Dallas, TX, United States

**11:53am Residual Strength Prediction of 3D Textile Composites under Combined Mechanical Loading and Hostile Environmental Conditions**

Technical Presentation. IMECE2018-89772

**Qingda Yang**, Univ Of Miami, Coral Gables, FL, United States, **Yuhang Yang**, University of Miami, Coral Gables, FL, United States

**12:14pm A Preliminary Design Method for Axial Turbine**

Technical Paper Publication. IMECE2018-88251

**Fan Yang**, Xi'an Jiaotong University, Xi'an, China, **Lei Li**, **Shouyi Sun**, Northwestern Polytechnical University, Xi'an, China

**3-6 LIGHTWEIGHT SANDWICH COMPOSITES AND LAYERED STRUCTURES ? IN HONOR OF PROF. FROSTIG**

**3-6-2 Lightweight Sandwich Composites and Layered Structures - 2 (in Honor of Prof. Frostig)**

**Third Floor, David L. Lawrence Convention Center, Room 306 10:50am - 12:35pm**

Session Chair: **Zhangxian Yuan**, Georgia Inst of Technology, Atlanta, GA, United States

Session Co-Chair: **Oded Rabinovitch**, Technion - Israel Institute of Technology, Haifa, OO, Israel

**10:50am Flexural Elastic Wave Propagation in a Periodic Composite Plate Structure Incorporating Microstructure, Surface Energy and Foundation Effects**

Technical Presentation. IMECE2018-87262

**Gongye Zhang**, **Xin-Lin Gao**, Southern Methodist University, Dallas, TX, United States

**11:05am Hygro-Thermal 2D Debonding in Sandwich-Like Tiles**

Technical Presentation. IMECE2018-88718

**Oded Rabinovitch**, Technion - Israel Institute of Technology, Haifa, Selected State/Province, Israel

**11:20am Dynamic stability behavior of sandwich panels under impulsive axial loads**

Technical Presentation. IMECE2018-88946

**Zhangxian Yuan**, Georgia Inst of Technology, Atlanta, GA, United States, **George Kardomateas**, Georgia Institute of Technology, Alpharetta, GA, United States

**11:35am A high order approach for sandwich beams with face/core debonds**

Technical Presentation. IMECE2018-88947

**Zhangxian Yuan**, Georgia Inst of Technology, Atlanta, GA, United States, **George Kardomateas**, Georgia Institute of Technology, Alpharetta, GA, United States, **Leif Carlsson**, Florida Atlantic University, Boca Raton, FL, United States

**11:50am EXACT ANALYTICAL BUCKLING LOADS CALCULATION OF THIN ORTHOTROPIC PLATES**

Technical Presentation. IMECE2018-88959

**Moshe Eisenberger**, Technion - Israel Inst. of Technology, Technion City, Israel, **Joseph Tenenbaum**, **Aharon Deutsch**, Technion - Israel Inst. Tech., Haifa, Israel

**12:05pm Influence of Core Deformation Constraints on Energy Release Rate in Debonding of Honeycomb Core Sandwich**

Technical Presentation. IMECE2018-89804

**Mohammad Tauhiduzzaman**, **Leif Carlsson**, Florida Atlantic University, Boca Raton, FL, United States

Draft Program

### 3-12 PERIDYNAMICS MODELING

#### 3-12-2 Peridynamics Modeling - 2

Third Floor, David L. Lawrence Convention Center,  
Room 307 10:50am - 12:35pm

Session Chair: **Erkan Oterkus**, *University of Strathclyde, Glasgow, United Kingdom*

Session Co-Chair: **Erdogan Madenci**, *University Of Arizona, Tucson, AZ, United States*

#### 10:50am Peridynamic Modeling of Composite Laminates

Technical Presentation. IMECE2018-89554

**Erdogan Madenci**, **Mehmet Dorduncu**, *University Of Arizona, Tucson, AZ, United States*, **Nam Phan**, *Naval Air Systems Command (NAVAIR), Patuxent River, MD, United States*

#### 11:11am Peridynamics Formulation for Beam Structures

Technical Presentation. IMECE2018-89550

**Cong Tien Nguyen**, **Selda Oterkus**, *University of Strathclyde, Glasgow, United Kingdom*

#### 11:32am Modeling Material Anisotropy with Peridynamics - Part I

Technical Presentation. IMECE2018-89962

**Pablo Seleson**, **Jeremy Trageser**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Max Gunzburger**, *Florida State University, Tallahassee, FL, United States*

#### 11:53am Modeling Material Anisotropy with Peridynamics - Part II

Technical Presentation. IMECE2018-89970

**Pablo Seleson**, **Jeremy Trageser**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Max Gunzburger**, *Florida State University, Tallahassee, FL, United States*

#### 12:14pm Generalized Mori-Tanaka approach in micromechanics of random structure peristatic composites

Technical Presentation. IMECE2018-89218

**Valeriy Buryachenko**, *Micromechanics & Composites LLC, Dayton, OH, United States*

### 3-3 NOVEL AEROSPACE PROPULSION SYSTEMS

#### 3-3-1 Novel Aerodynamics and Aerospace Propulsion Systems

Fourth Floor, David L. Lawrence Convention Center,  
Room 403 2:05pm - 3:50pm

Session Chair: **Jose C. Pascoa**, *Universidade Da Beira Interior, Covilha 6200, Portugal*

Session Co-Chair: **Carlos Xisto**, *Chalmers University of Technology, Göteborg, Sweden*, **Abdollah Afjeh**, *University Of Toledo, Toledo, OH, United States*

#### 2:05pm Numerical Analysis of a Multi-Species MHD Model for Plasma Layer Control of Re-Entry Vehicles

Technical Paper Publication. IMECE2018-87467

**Filipe Dias**, *Universidade Da Beira Interior, Covilhã, Portugal*, **Carlos Xisto**, *Chalmers University of Technology, Göteborg, Sweden*, **Jose C. Pascoa**, *Universidade Da Beira Interior, Covilha 6200, Portugal*

#### 2:26pm Flight Load Analysis and Prediction based on Scaled Sequential Threshold Least-Squares (S2TLS) Algorithm

Technical Presentation. IMECE2018-88993

**Shengwei Zhu**, *University of South Carolina, Columbia, SC, United States*, **Yi Wang**, *Univ. of South Carolina, Columbia, SC, United States*

#### 2:47pm A Novel Approach for Satellite Attitude Control by Using Solar Sailing

Technical Paper Publication. IMECE2018-88311

**Ni Li**, **P. Arguelles**, **K. Chaput**, *California State University, Los Angeles, Los Angeles, CA, United States*, **S. Kenan**, *California State University, Los Angeles, Los Angeles, CA, United States*, **S. Kim**, **D. Li**, *California State University, Los Angeles, Los Angeles, CA, United States*, **Y. Vazquez**, *California State University, Los Angeles, Los Angeles, CA, United States*, **D. Viveros**, **T. Nye**, *California State University, Los Angeles, Los Angeles, CA, United States*, **K. Salinas**, *Northrop Grumman, Carson, CA, United States*

#### 3:08pm A Review of Propulsion Systems for Cubesats

Technical Paper Publication. IMECE2018-88174

**Jose C. Pascoa**, *Universidade Da Beira Interior, Covilha 6200, Portugal*, **Stefano Teixeira**, **Gustavo Filipe**, *Universidade da Beira Interior, Covilhã, District State/Province, Portugal*

### 3-4 ADVANCES IN AEROSPACE STRUCTURES AND MATERIALS

#### 3-4-2 Advances in Aerospace Structures and Materials - 2

Third Floor, David L. Lawrence Convention Center,  
Room 306 2:05pm - 3:50pm

Session Chair: **Yingtao Liu**, *University of Oklahoma, Norman, OK, United States*

Session Co-Chair: **Dianyun Zhang**, *University of Connecticut, Storrs, CT, United States*

#### 2:05pm Method of creating Composite Manufacture drawing.

Technical Presentation. IMECE2018-88823

**CHETHAN RANGASWAMY**, *Rolls-Royce, Pune, -, India*

#### 2:26pm STATIC FAILURE ANALYSIS OF TEXTILE COMPOSITE STRUCTURES USING MECHANICS OF STRUCTURE GENOME IN MSC.NASTRAN

Technical Presentation. IMECE2018-89175

**Xin Liu**, *Purdue University, West Lafayette, IN, United States*, **Federico Gasco**, *Spirit AeroSystems, Inc, Wichita, KS, United States*, **Wenbin Yu**, *Purdue University, West Lafayette, IN, United States*

**2:47pm** Low-Velocity Impact and Interlaminar Fracture Toughness of Unidirectional and Quasi 3D Braided Composite

Technical Presentation. IMECE2018-89719

*Tony Wentz, Wu Zhou, Xinyu Mao, Michigan State University, Lansing, MI, United States, Danielle Zeng, Ford, Dearborn, MI, United States, Xinran Xiao, Michigan State University, Lansing, MI, United States*

**3:08pm** Imperfection-Insensitive Axially Loaded Cylindrical Shells

Technical Presentation. IMECE2018-89894

*Xin Ning, The Pennsylvania State University, Urbana, IL, United States*

**3:29pm** Homogenization estimates for viscoelastic composites based on an incremental variational principle

Technical Presentation. IMECE2018-89598

*Jose E. Cotelso Alonso, Pedro Ponte Castañeda, University of Pennsylvania, Philadelphia, PA, United States*

### **3-10 IMPACT, DAMAGE AND FRACTURE OF COMPOSITE STRUCTURES**

**3-10-1 Impact, Damage and Fracture of Composite Structures**

**Third Floor, David L. Lawrence Convention Center, Room 307 2:05pm - 3:50pm**

Session Chair: **Kwek Tze Tan**, *The University of Akron, Akron, OH, United States*

Session Co-Chair: **Ali Najafi**, *ANSI S Inc, Houston, TX, United States*

**2:05pm** Mode-II Crack Initiation of Carbon Fiber Epoxy under Marine Conditions

Technical Presentation. IMECE2018-89875

*Rodrigo Chavez, University of California San Diego, San Diego, CA, United States, Veronica Eliasson, UC San Diego, San Diego, CA, United States*

**2:20pm** Composite Fan Case Damage From Fan Blade Out Replicated With Flat Panel Gas Gun Testing

Technical Presentation. IMECE2018-89178

*Andy VanderKlok, Williams International, Commerce Charter Twp, MI, United States, Jim Dorer, Xinran Xiao, Michigan State University, Lansing, MI, United States*

**2:35pm** Experimental Specimen for Classification of Matrix Compression Damage in Carbon Fiber Reinforced Polymers

Technical Paper Publication. IMECE2018-87132

*Taylor Rawlings, Kevin Carpenter, John P. Parmigiani, Oregon State University, Corvallis, OR, United States*

**2:50pm** Effect of Low Temperature Arctic Conditions on Impact and Post-Impact Mechanisms of Composite Sandwich Structures

Technical Presentation. IMECE2018-88556

*Kwek Tze Tan, Mahfujul Khan, The University of Akron, Akron, OH, United States*

**3:05pm** Lightning Strike Protection and EMI Shielding of Fiber Reinforced Composite Using Gold and Silver Nanofilms

Technical Paper Publication. IMECE2018-88639

*Praveen Bollavaram, Muhammad Rahman, Ramazan Asmatulu, Wichita State University, Wichita, KS, United States*

**3:20pm** Elastic Metamaterial Design to Filter Harmonic Mechanical Wave Propagation

Technical Paper Publication. IMECE2018-87753

*Gustavo Rodrigues, Universidade Estácio de Sá, Rio De Janeiro, Brazil, Hans Weber, Pontifical Catholic University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil, Larissa Driemeier, University of São Paulo, São Paulo, Brazil*

### **3-12 PERIDYNAMICS MODELING**

**3-12-3 Peridynamics Modeling - 3**

**Third Floor, David L. Lawrence Convention Center, Room 307 4:00pm - 5:45pm**

Session Chair: **Erdogan Madenci**, *University Of Arizona, Tucson, AZ, United States*

Session Co-Chair: **Erkan Oterkus**, *University of Strathclyde, Glasgow, United Kingdom*

**4:00pm** Peridynamic Model to Predict Fracture Evolution During Lithiation Process

Technical Presentation. IMECE2018-89372

*Hanlin Wang, Erkan Oterkus, Selda Oterkus, University of Strathclyde, Glasgow, United Kingdom*

**4:21pm** Peridynamic Modeling of Concrete Pavement Structures

Technical Presentation. IMECE2018-89515

*Nicolas Sau, Jose Medina, Universidad de Sonora, Hermosillo, Sonora, Mexico*

**4:42pm** Peridynamic Modelling of A Viscoelastic Material

Technical Presentation. IMECE2018-89659

*Yunke Huang, Selda Oterkus, University of Strathclyde, Glasgow, United Kingdom*

**5:03pm** Computational Homogenization in Peristatics of Periodic Structure Composites

Technical Paper Publication. IMECE2018-86517

*Valeriy Buryachenko, Micromechanics & Composites LLC, Dayton, OH, United States*

**Draft Program**

### **3-13 MULTIBODY DYNAMICS SIMULATION IN AERO-SPACE STRUCTURES**

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#### **3-13-1 Multibody Dynamics Simulation in Aerospace Structures**

**Fourth Floor, David L. Lawrence Convention Center, Room 403 4:00pm - 5:45pm**

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Session Chair: **Jinwei Shen**, *University of Alabama, Tuscaloosa, AL, United States*

Session Co-Chair: **Charles Wojnar**, *Missouri S&T, Rolla, MO, United States*

#### **4:00pm Real Time Loading Test Rig for Flight Control Actuators Under PHM Experimentation**

Technical Paper Publication. IMECE2018-86967

**Piergiorgio Chiavaroli, Giuseppe Evangelista, Andrea de Martin**, *Politecnico di Torino, Torino, TO, Italy*, **Giovanni Jacazio, Massimo Sorli**, *Politecnico Di Torino - Department of Mechanical and Aerospace Engineering, Torino, TO, Italy*

#### **4:21pm Experimental Flight Validation of NATASHA's Results for Aeroelastic Analysis of a HALE Aircraft**

Technical Presentation. IMECE2018-87878

**Ehsan Izadpanahi, Kishan Kalpoe**, *Florida International University, Miami, FL, United States*, **Pezhman Mardanpour**, *Florida International University, Weston, FL, United States*

#### **4:42pm Fundamental Understanding of Propeller Whirl Flutter through Multibody Dynamics Simulation**

Technical Presentation. IMECE2018-87922

**Christian Hoover**, *The University of Alabama, Tuscaloosa, AL, United States*, **Jinwei Shen**, *University of Alabama, Tuscaloosa, AL, United States*

#### **5:03pm Multibody Dynamics Study of Effects of Hub Type on Tiltrotor Whirl Flutter and Rotor Loads**

Technical Presentation. IMECE2018-88793

**Kyle Nelson**, *The University of Alabama, Tuscaloosa, AL, United States*, **Jinwei Shen**, *University of Alabama, Tuscaloosa, AL, United States*, **Christian Hoover**, *The University of Alabama, Tuscaloosa, AL, United States*

#### **5:24pm Multibody Dynamics Analysis of Helicopter Rotor-Fuselage Systems**

Technical Presentation. IMECE2018-88795

**Jennifer Baggett**, *University of Alabama, Gardendale, AL, United States*, **Jinwei Shen**, *University of Alabama, Tuscaloosa, AL, United States*

### **3-17 NONLINEAR PROBLEMS IN AEROSPACE STRUCTURES**

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#### **3-17-1 Nonlinear Problems in Aerospace Structures**

**Third Floor, David L. Lawrence Convention Center, Room 306 4:00pm - 5:45pm**

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Session Chair: **Erasmus Carrera**, *Politecnico Di Torino, Torino, Italy*

#### **4:00pm Comparative Study of Post-Buckling Load Redistribution in Stiffened Aircraft Panel With and Without Material Nonlinearity**

Technical Paper Publication. IMECE2018-86346

**ENES AYDIN**, *Turkish Aerospace Industries, ANKARA, ANKARA, Turkey*, **Altan Kayran**, *METU Center for Wind Energy, Ankara, Turkey*

#### **4:21pm A Global-Local Strategy for the Elastoplastic Analysis of Complex Metallic Structures via Component-Wise Approach**

Technical Paper Publication. IMECE2018-86564

**Erasmus Carrera, Ibrahim Kaleel, Manish Nagaraj**, *Politecnico Di Torino, Torino, Italy*, **Marco Petrolo**, *Politecnico di Torino, Turin, Italy*

#### **4:42pm Evaluation of In-Plane and Out-of-Plane Stresses in Composite Structures Subjected to Large Displacements/Rotations**

Technical Paper Publication. IMECE2018-86671

**Alfonso Pagani, Riccardo Augello, Erasmus Carrera**, *Politecnico Di Torino, Torino, Italy*

#### **5:03pm Virtual Vibration Correlation Technique (VCT) for Nonlinear Analysis of Metallic and Composite Structures**

Technical Paper Publication. IMECE2018-86674

**Alfonso Pagani, Riccardo Augello, Erasmus Carrera**, *Politecnico Di Torino, Torino, Italy*

#### **5:24pm Nonlinear Dynamics of Rotating Structures and Helicopter Blades**

Technical Paper Publication. IMECE2018-86786

**Matteo Monti, Alfonso Pagani, Erasmus Carrera**, *Politecnico Di Torino, Torino, Italy*

### **Biomedical & Biotechnology Engineering WEDNESDAY, NOVEMBER, 14**

#### **4-1 BIOMEDICAL AND BIOTECHNOLOGY PLENARY PRESENTATION**

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##### **4-1-1 Biomedical and Biotechnology Plenary I**

**Third Floor, David L. Lawrence Convention Center, Room 303 9:00am - 9:45am**

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#### **9:00am Acoustofluidics: Merging Acoustics and Microfluidics for Biomedical Applications**

Plenary Presentation. IMECE2018-90094

**Tony Jun Huang**, *Duke University, Durham, NC, United States*

## 4-2 DAMAGE BIOMECHANICS

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### 4-2-4 Damage Biomechanics IV: Cavitation as a Mechanism for Brain Injury

Third Floor, David L. Lawrence Convention Center,  
Room 309 10:00am - 11:45am

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Session Chair: **Rika Carlsen**, *Robert Morris University, Moon Township, PA, United States*

Session Co-Chair: **X. Gary Tan**, *U.S. Naval Research Lab, Washington, DC, United States*

**10:00am** Cavitation nucleation in tissue simulant due to mechanical impact

Technical Presentation. IMECE2018-88941

**Wonmo Kang**, *NRL, Washington, DC, United States*, **Ashfaq Adnan**, *University of Texas Arlington, Arlington, TX, United States*, **Amit Bagchi**, *U.S. Naval Research Laboratory, Washington, DC, United States*

**10:15am** Acceleration-induced pressure gradient and cavitation in soft biomaterials during mechanical impact

Technical Presentation. IMECE2018-88942

**Wonmo Kang**, *NRL, Washington, DC, United States*, **Marc Raphael**, *Navel Research Lab, Washington, DC, United States*

**10:30am** Computational Study of Cavitation Nucleation in Gelatin Due to Impact and Shock

Technical Presentation. IMECE2018-89828

**Fuad Hasan**, **Siddarth Chintamani Brin Deem**, *University of Texas at Arlington, Arlington, TX, United States*, **Amit Bagchi**, *U.S. Naval Research Laboratory, Washington, DC, United States*, **Thomas O'Shaughnessy**, *Naval Research Laboratory, Washington, DC, United States*, **Wonmo Kang**, *NRL, Washington, DC, United States*, **Ashfaq Adnan**, *University of Texas Arlington, Arlington, TX, United States*

**10:45am** Computational Study of Mild Traumatic Brain Injury Due to Shock Induced Bubble Dynamics in Viscoelastic Soft Tissues

Technical Presentation. IMECE2018-89820

**Fuad Hasan**, *University of Texas at Arlington, Arlington, TX, United States*, **Yuan Ting Wu**, *The University of Texas at Arlington, Arlington, TX, United States*, **Ashfaq Adnan**, *University of Texas Arlington, Arlington, TX, United States*

**11:00am** Interfacial shear behavior of collagen triple helix bundle

Technical Presentation. IMECE2018-89989

**Khandakar Mahmud**, **Yuan Ting Wu**, *The University of Texas at Arlington, Arlington, TX, United States*, **Ashfaq Adnan**, *University of Texas Arlington, Arlington, TX, United States*

## 4-8 DYNAMICS AND CONTROL OF BIOMECHANICAL SYSTEMS

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### 4-8-1 Dynamics and Control of Biomechanical Systems I

Room 310 10:00am - 11:45am

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Session Chair: **Dumitru Caruntu**, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Chair: **Bogdan Epureanu**, *University of Michigan, Ann Arbor, MI, United States*, **Davide Piovesan**, *Gannon University, Erie, PA, United States*

**10:00am** Virtual Interaction Between Patients and Occupational Therapists Using an Assistive Robotic Device With Cyber-Physical System

Technical Paper Publication. IMECE2018-87289

**Marvin Cheng**, *Embry-Riddle Aeronautical University, Morgan-town, WV, United States*, **Po-Lin Huang**, **Hao-Chuan Chu**, **Li-Han Peng**, *National Tsing Hua University, Hsinchu, Taiwan*, **Ezzat Bakhoum**, *University of West Florida, Pensacola, FL, United States*

**10:21am** Estimation of Hip and Ankle Visco-Elastic Parameters During Quiet Standing

Technical Paper Publication. IMECE2018-87585

**Angel Cerda-Lugo**, **Alejandro González**, *UASLP, San Luis Potosi, Select State/Province, Mexico*, **Antonio Cardenas**, *UASLP, San Luis Potosã, Mexico*, **Davide Piovesan**, *Gannon University, Erie, PA, United States*

**10:42am** Viscoelastic Characterization of Woven Dacron for Aortic Grafts by Using Direction-Dependent Quasi-Linear Viscoelasticity

Technical Paper Publication. IMECE2018-87806

**Eleonora Tubaldi**, *University of Arizona, Tucson, AZ, United States*, **Giovanni Ferrari**, **Prabakaran Balasubramanian**, **Ivan Breslavskiy**, **Marco Amabili**, *McGill University, Montreal, QC, Canada*

**11:03am** 2-D Inverse Dynamics Knee Model: Aligning Anatomical Knee Model With Squatting Kinematic Data Using Ligament Forces

Technical Paper Publication. IMECE2018-88123

**Jose M. Salinas**, **Dumitru Caruntu**, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

**11:24am** A Dynamic Escape Problem of Molecular Motors

Technical Paper Publication. IMECE2018-88612

**Dean Culver**, *Army Research Laboratory, Durham, NC, United States*, **Bryan Glaz**, *Army Research Laboratory, Aberdeen, MD, United States*, **Samuel C. Stanton**, *US Army Research Office, Durham, NC, United States*

## 4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS

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### 4-10-1 Biomedical Modeling I

**Room 311 10:00am - 11:45am**

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Session Chair: **Yi Hua**, *University of Pittsburgh, Pittsburgh, PA, United States*

Session Co-Chair: **Chao Liang**, *Praxair, Inc., Tonawanda, NY, United States*

**10:00am Hydrodynamic Recruitment of Leukocytes Is Influenced by Adherent Cell Morphology**  
Technical Paper Publication. IMECE2018-86502

**Dhananjay Subramaniam**, *University of Cincinnati, Cincinnati, OH, United States*, **David Gee**, *Gannon University, Erie, PA, United States*

**10:21am Finite Element modeling of crimping and sealing of metallic braided stents for endovascular repair (EVAR)**

Technical Presentation. IMECE2018-87025

**Jayendiran Raja**, *Texas A & M university, Doha, Doha, Qatar*, **Annie Ruimi**, *Texas A& M University at Qatar, College Station, TX, United States*, **Bakr Nour**, *Weill cornell Medicine, Doha, Doha, Qatar*

**10:42am Degradation Modeling of Bioabsorbable Polymer Stent**

Technical Paper Publication. IMECE2018-88116

**PENGFEI DONG**, *University of Nebraska-Lincoln, LINCOLN, NE, United States*, **Longzhen Wang**, *University of Nebraska Lincoln, Lincoln, NE, United States*, **Linxia Gu**, *University of Nebraska-Lincoln, Lincoln, NE, United States*

**11:03am Multiscale and Multiphysics Modeling of Thrombus Biomechanics in Circulation**

Technical Presentation. IMECE2018-88761

**Alireza Yazdani**, **George Karniadakis**, *Brown University, Providence, RI, United States*

**11:24am Numerical Study of Passive Micromixers for DNA Analysis**

Technical Presentation. IMECE2018-89133

**Ritesh Agarwal**, **Tarek Abdel-Salam**, **Stephanie George**, *East Carolina University, Greenville, NC, United States*

## 4-11 MUSCULOSKELETAL AND SPORTS BIOMECHANICS

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### 4-11-1 Sports related brain injury and modeling

**Third Floor, David L. Lawrence Convention Center, Room 315 10:00am - 11:45am**

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Session Chair: **Yuan Feng**, *Shanghai Jiao Tong University, Shanghai, China*

Session Co-Chair: **Parisa Saboori**, *Manhattan College, Riverdale, NY, United States*

**10:00am Development of a Low-Cost Mechanical Model of a Human Head**

Technical Paper Publication. IMECE2018-87129

**Grace Foltz**, **Elizabeth Tillotson**, *University of Alabama, Tuscaloosa, AL, United States*, **Beth Todd**, *Univ Of Alabama, Tuscaloosa, AL, United States*

**10:21am Study of Head Concussions on Female Soccer Players**

Technical Paper Publication. IMECE2018-88347

**Peyman Honarmandi**, **Alessandra Palmisano**, *Manhattan College, Riverdale, NY, United States*, **Iryna Stashuk**, *City College of New York, New York, NY, United States*, **Shawn Ladda**, *Manhattan College, Riverdale, NY, United States*

**10:42am Neck Loading Model of a Child in a Car Seat**

Technical Paper Publication. IMECE2018-88363

**Parisa Saboori**, **Gregory Bohn**, **Caitlin Hall**, **Kathia Coronado**, **Veronica Valerio**, *Manhattan College, Riverdale, NY, United States*

**11:03am A new scaling relationship between human and mouse brain to study concussion**

Technical Presentation. IMECE2018-90033

**Haojie Mao**, *Western University, Detroit, MI, United States*, **Lihong Lu**, **Kewei Bian**, *Western university, London, ON, Canada*

**11:24am Age Related Brain Atrophy and Vulnerability to TBI**

Technical Presentation. IMECE2018-87498

**Arpad Bakonyi**, **Alan Fajtelewicz**, **Siavash Hashemi**, *The City College of New York, New York, NY, United States*, **Shahab Mansourbakhshi**, *City College of New York, New York, NY, United States*, **Ali Sadegh**, *City Univ Of New York, New York, NY, United States*

## 4-3 VIBRATION AND ACOUSTICS IN BIOMEDICAL APPLICATIONS

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### 4-3-1 Vibration Characteristics and Characterisations

**Third Floor, David L. Lawrence Convention Center, Room 309 1:45pm - 3:30pm**

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Session Chair: **Ping Zhao**, *Hefei University of Technology, Hefei, China*

Session Co-Chair: **Toshihiko Shiraishi**, *Yokohama National University, Yokohama, Japan*

**1:45pm Acoustic Radiation of Axially Stepped-Thickness Piezoelectric Cylindrical Shells**

Technical Paper Publication. IMECE2018-86306

**Ata Meshkinzar**, **Ahmed M Al-Jumaily**, *Auckland University of Technology, Auckland, New Zealand*

**2:06pm Investigation of the Scattering of Focused Ultrasound Waves at Bones**

Technical Paper Publication. IMECE2018-87133

**Christoph Schaal**, **Vibhav Durgesh**, *California State University, Northridge, CA, United States*

**2:27pm** Influence of Brain Cooling on Frequency Characteristics of the Epileptic Focus and its Surrounding Area

Technical Paper Publication. IMECE2018-87288

*Saya Kumano*, Yamaguchi University, Ube, Japan, *Takashi Saito*, Yamaguchi University, Ube / Yamaguchi, Japan, *Kenyu Uehara*, Yamaguchi University, Ube, Select State/Province, Japan

**2:48pm** Determination of Mechanical Properties of Human Skull With Modal Analysis

Technical Paper Publication. IMECE2018-88103

*Ashkan Eslaminejad*, *Mohammad Hosseini Farid*, *Mohammadreza Ramzanpour*, *Mariusz Ziejewski*, *Ghodrat Karami*, North Dakota State University, Fargo, ND, United States

## **4-8 DYNAMICS AND CONTROL OF BIOMECHANICAL SYSTEMS**

### **4-8-2 Dynamics and Control of Biomechanical Systems II**

**Room 310** 1:45pm - 3:30pm

Session Chair: **Davide Piovesan**, Gannon University, Erie, PA, United States

Session Co-Chair: **Dumitru Caruntu**, University of Texas Rio Grande Valley, Edinburg, TX, United States, **Bogdan Epureanu**, University of Michigan, Ann Arbor, MI, United States

**1:45pm** Develop a Flexible Regenerative Exoskeleton to Assist Walking

Technical Paper Publication. IMECE2018-88179

*Longhan Xie*, *Xiaodong Li*, South China University of Technology, Guangzhou, China

**2:06pm** Is Linear Camera Space Manipulation Impervious to Systematic Distortions?

Technical Paper Publication. IMECE2018-87645

*Felipe Martinez*, UASLP, San Luis Potosi, Select State/Province, Mexico, *Adam Mihalko*, *Lillian Blum*, Gannon University, Erie, PA, United States, *Antonio Cardenas*, UASLP, San Luis Potosi, Mexico, *Davide Piovesan*, Gannon University, Erie, PA, United States

**2:27pm** Robust and Iterative Learning Control of Agonist / Antagonist Pair

Technical Presentation. IMECE2018-87939

*Patrick J Schimoler*, Allegheny General Hospital, Pittsburgh, PA, United States, *Jeffrey S Vipperman*, University Of Pittsburgh, Pittsburgh, PA, United States, *Mark Carl Miller*, Allegheny General Hospital, Pittsburgh, PA, United States

**2:48pm** Design of Robotic System for Cognitive Rehabilitation Based on Machine Vision

Technical Presentation. IMECE2018-88909

*Haodong Chen*, *Ping Zhao*, *Kangren Zhao*, *Wenxiu Chen*, Hefei University of Technology, Hefei, Anhui, China

**3:09pm** Design and Evaluation of Controllers for an Elastically Strapped Lower Extremity Exoskeleton

Technical Presentation. IMECE2018-89965

*Xianlian Zhou*, New Jersey Institute of Technology, Newark, NJ, United States, *Xinyu Chen*, CFD Research Corporation, Huntsville, AL, United States

## **4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS**

### **4-10-2 Biomedical Modeling II**

**Room 311** 1:45pm - 3:30pm

Session Chair: **Yi Hua**, University of Pittsburgh, Pittsburgh, PA, United States

Session Co-Chair: **Chao Liang**, Praxair, Inc., Tonawanda, NY, United States

**1:45pm** Evaluation of Soft Material Fracture Behavior via Indentation Testing With a Needle-Like Indenter

Technical Paper Publication. IMECE2018-87199

*Takayuki Ishino*, Graduate School, Kyoto Institute of Technology, Kyoto, Japan, *Atsushi Sakuma*, Kyoto Institute of Technology, Kyoto, Japan

**2:06pm** Validation of a Finite Element Model of the Mechanical Performance of Surgical Knots of Varying Topology

Technical Paper Publication. IMECE2018-87868

*Arz Y. Qwam Alden*, Western Michigan University, Department of Mechanical and Aerospace Engineering, Kalamazoo, MI, United States, *Andrew C. Geeslin*, Western Michigan University, Kalamazoo, MI, United States, *Peter A. Gustafson*, Western Michigan University, Kalamazoo, MI, United States

**2:27pm** The Influence of Primary Blast Wave on the Posterior Part of the Eyeball

Technical Paper Publication. IMECE2018-88113

*Junfei Tong*, University of Nebraska Lincoln, Lincoln, NE, United States, *Linxia Gu*, University of Nebraska-Lincoln, Lincoln, NE, United States

**2:48pm** A Computational Model of Continuous Low Cerebrovascular Arterioles Using a Fractal L-System

Technical Paper Publication. IMECE2018-88511

*Nicolas Cuitino*, Rutgers University, Piscataway, NJ, United States, *Assimina Pelegri*, Rutgers University, East Brunswick, NJ, United States, *Benjamin Johannesson*, Boyce Technologies, Long Island City, NJ, United States

**3:09pm** A Machine Learning Approach for Intraoperative Reconstruction of Soft Tissue

Technical Presentation. IMECE2018-89929

*Ye Han*, *Qi Wang*, *Yoed Rabin*, *Levent Burak Kara*, Carnegie Mellon University, Pittsburgh, PA, United States

## 4-11 MUSCULOSKELETAL AND SPORTS BIOMECHANICS

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### 4-11-2 Musculoskeletal biomechanics

Third Floor, David L. Lawrence Convention Center,  
Room 315 1:45pm - 3:30pm

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Session Chair: **Peyman Honarmandi**, *Manhattan College, Riverdale, NY, United States*

Session Co-Chair: **Yuan Feng**, *Shanghai Jiao Tong University, Shanghai, China*

#### 1:45pm Evaluation of ACL Insertion Site Load Transmission

Technical Presentation. IMECE2018-86829

**Michael Smolinski, Brandon Marshall, Monica Linde, Freddie H. Fu, Patrick Smolinski, William Slaughter**, *University of Pittsburgh, Pittsburgh, PA, United States*

#### 2:06pm Prophylactic brace design to prevent ACL injuries

Technical Presentation. IMECE2018-88393

**Gregory Bohn, Parisa Saboori**, *Manhattan College, Riverdale, NY, United States*, **Lorraine Piccorelli**, *Manhattan College, Bronx, NY, United States*

#### 2:27pm ACL Graft Position in the Tunnel

Technical Presentation. IMECE2018-86835

**Junjun Zhu, Brandon Marshall**, *University of Pittsburgh, Pittsburgh, PA, United States*, **Xin Tong**, *Dept of Orthopaedic Surgery, Pittsburgh, PA, United States*, **Michael Smolinski, Joon Ho Wang, Monica Linde, Freddie H. Fu, Patrick Smolinski**, *University of Pittsburgh, Pittsburgh, PA, United States*

#### 2:48pm A Misoriented Biceps Tendon Repair Has No Effect on Strength

Technical Presentation. IMECE2018-87415

**Sean Delserro**, *University of Pittsburgh, Pittsburgh, PA, United States*, **Tyler Madonna**, *Rehab Neural Engineering Labs, Pittsburgh, PA, United States*, **Stephen Liu**, *Penn Orthopaedics, Exton, PA, United States*, **Michael Smolinski**, *University of Pittsburgh, Pittsburgh, PA, United States*, **Joseph Styron**, *Cleveland Clinic, Cleveland, OH, United States*, **Nicholas Vaudreuil, Brandon Brown, Patrick Smolinski, Mark Miller**, *University of Pittsburgh, Pittsburgh, PA, United States*, **Christopher Schmidt**, *Orthopaedic Specialists, Pittsburgh, PA, United States*

#### 3:09pm Assessing Non-Uniform Stiffening of the Achilles Tendon Noninvasively Using Surface Wave Elastography

Technical Presentation. IMECE2018-89879

**Muhammad Salman**, *Kennesaw State University, Marietta, GA, United States*, **Karim Sabra**, *Georgia Institute of Technology, Marietta, GA, United States*

## 4-3 VIBRATION AND ACOUSTICS IN BIOMEDICAL APPLICATIONS

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### 4-3-2 Vibration applications to Therapy and Rehabilitation

Third Floor, David L. Lawrence Convention Center,  
Room 309 3:45pm - 5:30pm

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Session Chair: **Takashi Saito**, *Yamaguchi University, Ube / Yamaguchi, Japan*

Session Co-Chair: **Toshihiko Shiraishi**, *Yokohama National University, Yokohama, Japan*

#### 3:45pm Design of Planar 1-DOF Rehabilitation Mechanisms via Kinematic-Mapping Motion Synthesis Framework

Technical Presentation. IMECE2018-88785

**Ping Zhao, Kangren Zhao, Wenxiu Chen, Haodong Chen**, *Hefei University of Technology, Hefei, China*

#### 4:06pm Fluid Impact Under Various Tapping Conditions for Biomedical Application(Shirodhara)

Technical Paper Publication. IMECE2018-87341

**Swathika M, Lakshmana Rao. C**, *Department of Applied Mechanics, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India*, **Balasubramanian Venkatesh**, *Department of Engineering Design, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India*

#### 4:27pm A Study of a Mechanism of Cell Proliferation Promotion of Cultured Osteoblasts by Mechanical Vibration

Technical Paper Publication. IMECE2018-87364

**Toshihiko Shiraishi, Akitoshi Nishijima**, *Yokohama National University, Yokohama, Japan*

#### 4:48pm Experimental Identification of Model Parameters and the Statistical Processing Using a Nonlinear Oscillator Applied to EEG Analysis

Technical Paper Publication. IMECE2018-88112

**Kenyu Uehara**, *Yamaguchi University, Ube, Select State/Province, Japan*, **Takashi Saito**, *Yamaguchi University, Ube / Yamaguchi, Japan*

## 4-4 BIOMEDICAL IMAGING AND TISSUE CHARACTERIZATION

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### 4-4-1 Tissue Characterisations

Third Floor, David L. Lawrence Convention Center,  
Room 308 3:45pm - 5:30pm

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Session Chair: **Margaret Nowicki**, *United States Military Academy, West Point, NY, United States*

Session Co-Chair: **Xiaoning Jiang**, *NC State University, Raleigh, NC, United States*

Draft Program

**3:45pm Relating Bone Intra-Cortical Elastic Stiffness to EDX Spectroscopy Mineralization Measurements**

Technical Paper Publication. IMECE2018-86233

*Ilige Hage, Remi Hage, Notre Dame University-Louaize, Zouk Mosbeh, Lebanon, Charbel Seif, American University Of Beirut, Beirut, Lebanon, Ramsey Hamade, American University Of Beirut, Beirut, Riad El Solh, Lebanon*

**4:06pm Human Mandibular Bone Density Distribution: Image Analysis and Patient-specific Bone Remodeling Simulation**

Technical Presentation. IMECE2018-86866

*Kangning Su, Kayla Reigh, Penn State University, State College, PA, United States, Li Yuan, Shenzhen People's Hospital, 2nd Clinical Medical College of Jinan University, Shen Zhen, Select State/Province, China, Jie Yang, Temple University, Philadelphia, PA, United States, Jing Du, Penn State University, State College, PA, United States*

**4:27pm A Modular Test Platform for Micromechanical Tensile Testing of Soft Biomaterials**

Technical Paper Publication. IMECE2018-87259

*Wilson Eng, Max Kim, Anand Ramasubramanian, Sang-Joon (John) Lee, San Jose State University, San Jose, CA, United States*

**4:48pm Compliance Effect on the Flow Condition in Vascular In Vitro Experiments**

Technical Paper Publication. IMECE2018-87362

*Masami Matsuura, Simon TUPIN, Makoto OHTA, Tohoku University, Sendai, Miyagi, Japan*

**5:09pm Temporal Evolution of Abnormal Aortic Wall Stress using image-based Vascular Mechanical Characterization (iV-MeCh) technique**

Technical Presentation. IMECE2018-88275

*Prahlad Menon, University of Pittsburgh, Pittsburgh, PA, United States, Mirunalini. Thirugnanasambandam, University of Texas at San Antonio, San Antonio, TX, United States, Stephane Avril, Ecole Nationale Supérieure Des Mines, Saint-Etienne, France, Ender Finol, The University of Texas at San Antonio, San Antonio, TX, United States, Senol Piskin, Tejas Canchi, University of Texas at San Antonio, San Antonio, TX, United States, Christof Karmonik, The Methodist Hospital, Houston, TX, United States, Soroosh Sanatkhani, University of Pittsburgh, Pittsburgh, PA, United States*

**4-8 DYNAMICS AND CONTROL OF BIOMECHANICAL SYSTEMS**

**4-8-3 Dynamics and Control of Biomechanical Systems III**

**Room 310 3:45pm - 5:30pm**

Session Chair: **Dumitru Caruntu**, University of Texas Rio Grande Valley, Edinburg, TX, United States

Session Co-Chair: **Davide Piovesan**, Gannon University, Erie, PA, United States, **Souransu Nandi**, University At Buffalo, Buffalo, NY, United States, **Dan Wang**, Old Dominion University, Norfolk, VA, United States

**3:45pm Arterial Wall Motion and its Dynamic Modeling for Arterial Stiffness and Damping**

Technical Paper Publication. IMECE2018-86883

*Dan Wang, Linda Vahala, Thomas Alberts, Old Dominion University, Norfolk, VA, United States, Zhili Hao, Old Dominion University, Virginia Beach, VA, United States*

**4:06pm Material and Posture Modeling for Sleeping on Soft Low-Density Porous Material**

Technical Paper Publication. IMECE2018-87249

*Takahiro Yamaguchi, Hajime Kimura, Graduate School, Kyoto Institute of Technology, Kyoto, Japan, Atsushi Sakuma, Kyoto Institute of Technology, Kyoto, Japan, Kazushige Takahashi, Shigetoshi Mimura, Toyo Quality One Corporation, Kawagoe, Japan*

**4:27pm Hypo/Hyperglycemic Constrained Design of IV Insulin Control for Type 1 Diabetic Patients With Meal and Initial Condition Uncertainties Using Sequential Quadratic Programming**

Technical Paper Publication. IMECE2018-87742

*Souransu Nandi, University At Buffalo, Buffalo, NY, United States, Tarunraj Singh, Suny At Buffalo, Buffalo, NY, United States*

**4:48pm Chance Constraint Based Design of IV Insulin Control for Type 1 Diabetic Patients Under Model and Meal Uncertainties**

Technical Paper Publication. IMECE2018-87759

*Souransu Nandi, University At Buffalo, Buffalo, NY, United States, Tarunraj Singh, Suny At Buffalo, Buffalo, NY, United States*

**4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS**

**4-10-3 Biomedical Modeling III**

**Room 311 3:45pm - 5:30pm**

Session Chair: **Junfei Tong**, University of Nebraska Lincoln, Lincoln, NE, United States

Session Co-Chair: **Chao Liang**, Praxair, Inc., Tonawanda, NY, United States

**3:45pm Fluid-Structure Interaction of Blood Flow in Human Aorta Under Dynamic Conditions: A Numerical Approach**

Technical Paper Publication. IMECE2018-87793

*Massimo Milani, University of Modena and Reggio Emilia, Reggio Emilia, Select State/Province, Italy, Francesca Martelli, University of Modena and Reggio Emilia, Reggio nell'Emilia, Reggio Emilia, Italy, Luca Montorsi, University of Modena and Reggio Emilia, Reggio Emilia, Italy, Guido Ligabue, Pietro Torricelli, University of Modena and Reggio Emilia, Modena, Italy*

**4:06pm Reconstruction of Swirling Blood Flow in the Heart and Aorta on the Basis of Measurements of Dynamic Geometry and Elastic Properties of the Flow Channel**

Technical Paper Publication. IMECE2018-87680

*Eugeny Talygin, Shota Zhorzholiani, Marina Tkhangapsova, Yuriy Tsygankov, Andrey Agafonov, Alexander Gorodkov, Gennadiy Kiknadze, Leo Bockeria, Bakulev Research Center for Cardiovascular Surgery, Moscow, Moscow, Russia*

**4:27pm Virtual Septoplasty Using Computational Fluid Dynamics**

Technical Presentation. IMECE2018-88153

*Masoud Ghorbani Moghaddam, Medical College of Wisconsin, Milwaukee, WI, United States, Julia S. Kimbell, University of North Carolina, Chapel Hill, NC, United States, Dennis O. Frank-Ito, Duke University, Durham, NC, United States, John S. Rhee, Guilherme J. M. Garcia, Medical College of Wisconsin, Milwaukee, WI, United States*

**4:48pm Comparison of Ablation Volume Produced With Multi-Tine Dry Type and Wet Type Electrodes During Radio Frequency Ablation: An In Vitro Study**

Technical Paper Publication. IMECE2018-88588

*Sundeeep Singh, Ramjee Repaka, Indian Institute of Technology Ropar, Rupnagar, Punjab, India*

**5:09pm Spatiotemporal organization of excitation and mechanical waves during life-threatening re-entrant cardiac arrhythmias**

Technical Presentation. IMECE2018-89458

*Amirhossein Molavi Tabrizi, Ata Mesgarnejad, Northeastern University, Boston, MA, United States, Jan Christoph, Stephan Luther, Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany, Maher N. Bazzi, University of Kansas School of Medicine-Wichita, Wichita, KS, United States, Alain Karma, Northeastern University, Boston, MA, United States*

**4-11 MUSCULOSKELETAL AND SPORTS BIOMECHANICS**

**4-11-3 Musculoskeletal and sport biomechanics**

Third Floor, David L. Lawrence Convention Center, Room 315 3:45pm - 5:30pm

Session Chair: **Parisa Saboori**, Manhattan College, Riverdale, NY, United States

Session Co-Chair: **Peyman Honarmandi**, Manhattan College, Riverdale, NY, United States

**3:45pm Anterior Cruciate Ligament Graft-Tunnel Relative Motion**

Technical Presentation. IMECE2018-86816

*Junjun Zhu, Brandon Marshall, University of Pittsburgh, Pittsburgh, PA, United States, Xin Tang, Dept of Orthopaedic Surgery, Pittsburgh, PA, United States, Weimin Zhu, Michael Smolinski, Monica Linde, Joon Ho Wang, Freddie H. Fu, Patrick Smolinski, University of Pittsburgh, Pittsburgh, PA, United States*

**4:06pm Finite Element Analysis of Dynamics of Human Muscle Compressed by Fabric Sleeve**

Technical Paper Publication. IMECE2018-87304

*Shodai Ueda, Graduate School, Kyoto Institute of Technology, Kyoto, Japan, Atsushi Sakuma, Kyoto Institute of Technology, Kyoto, Japan*

**4:27pm Assessment Of Muscle Stiffness While Using Single Axis Accelerometers**

Technical Presentation. IMECE2018-89728

*Carlos Munoz, Muhammad Salman, Kennesaw State University, Marietta, GA, United States*

**4:48pm Computational Prediction of Neck Musculoskeletal Loading in Walking and Running with Head Supported Mass**

Technical Presentation. IMECE2018-89808

*Xianlian Zhou, New Jersey Institute of Technology, Newark, NJ, United States, Xinyu Chen, Paulien Roos, Phillip Whitley, CFD Research Corporation, Huntsville, AL, United States*

**5:09pm Gait Analysis for Muscular Forces Evaluation in Human Movement: Integration Protocol of Typical Measurement Methods**

Technical Paper Publication. IMECE2018-87670

*Massimo Milani, Luca Fontanili, Luca Montorsi, University of Modena and Reggio Emilia, Reggio Emilia, Select State/Province, Italy, Giordano Valente, Medical Technology Laboratory, Rizzoli Orthopaedic Institute, Bologna, Italy*

**THURSDAY, NOVEMBER, 15**

**4-1 BIOMEDICAL AND BIOTECHNOLOGY PLENARY PRESENTATION**

**4-1-2 Biomedical and Biotechnology Plenary II**

Third Floor, David L. Lawrence Convention Center, Room 304 8:00am - 8:45am

**8:00am New Directions in Medical Ultrasound**

Plenary Presentation. IMECE2018-90095

*Mostafa Fatemi, Mayo Clinic, Rochester, MN, United States*

**4-4 BIOMEDICAL IMAGING AND TISSUE CHARACTERIZATION**

**4-4-2 Biomedical Imaging and Characterisation**

Third Floor, David L. Lawrence Convention Center, Room 308 8:55am - 10:40am

Session Chair: **Mostafa Fatemi**, Mayo Clinic, Rochester, MN, United States

Session Co-Chair: **Assimina Pelegri**, Rutgers University, East Brunswick, NJ, United States

**8:55am Analysis Of High Frequency Ultrasound Power Spectrum Peak Density For Detecting Soft Tissue Microstructure/Pathology**

Technical Presentation. IMECE2018-86568

*Jeremy Stromer, University of Connecticut, Storrs, CT, United States, Koushik Paul, Jorge Fernandez Losada, The University of Texas at Arlington, Arlington, TX, United States, Leila Ladani, University of Texas at Arlington, Arlington, TX, United States*

**9:10am Deep Convolutional Neural Networks for Breast Image Analysis on Holographic Microwave Imaging**

Technical Paper Publication. IMECE2018-86765

*LULU WANG, JINZHANG XU, Hefei University of Technology, Hefei, China*

**9:25am** Investigating the Progression of Alzheimer's Disease Using Digital Volume Correlation Algorithm and Strain As a Metric

Technical Paper Publication. IMECE2018-87563

*Annastacia McCarty, Sarah Bentil, Iowa State University, Ames, IA, United States*

**9:40am** Temporal Evolution of the Walls of Elastase-induced Rabbit Aneurysms

Technical Presentation. IMECE2018-88290

*Chao Sang, University of Pittsburgh, Pittsburgh, PA, United States, David F. Kallmes, Mayo Clinic, Rochester, MN, United States, Simon C. Watkins, Anne M. Robertson, University of Pittsburgh, Pittsburgh, PA, United States*

**9:55am** A Computational Simulation of Brain White Matter Accounting for Structural Anisotropy in Frequency Domain

Technical Presentation. IMECE2018-88488

*Xuehai Wu, Daniel Sullivan, Rutgers University, Piscataway, NJ, United States, John Georgiadis, University Of Illinois Uc, Urbana, IL, United States, Assimina Pelegri, Rutgers University, East Brunswick, NJ, United States*

**10:10am** Optical Microlaser Sensing Devices for Brain Activity Monitoring

Technical Presentation. IMECE2018-89316

*Maurizio Manzo, University of North Texas, Denton, TX, United States*

**4-5 BIOMATERIALS AND TISSUE: MODELLING, SYNTHESIS, FABRICATION AND CHARACTERIZATION**

**4-5-1 Biomaterials and Tissue I: Fabrication**

**Third Floor, David L. Lawrence Convention Center, Room 309 8:55am - 10:40am**

Session Chair: **Anil Saigal**, Tufts University, Medford, MA, United States

Session Co-Chair: **Seyed Allameh**, Northern Kentucky Univ, Newport, KY, United States

**8:55am** Stretch-and-Folding Method to Mass Produce Biomedical Nanofibers

Technical Presentation. IMECE2018-87975

*Mingkun Wang, Lanziye He, Chunxiao Cui, Drexel University, Philadelphia, PA, United States, Li-Hsin Han, Drexel University, Philadelphia, PA, United States*

**9:16am** Effect of laser texturing and plasma nitriding on titanium

Technical Presentation. IMECE2018-89446

*Mohammad Hossan, Morshed Khandaker, University of Central Oklahoma, Edmond, OK, United States*

**9:37am** In Situ Contactless 3D Printing of Cellular Structures

Technical Presentation. IMECE2018-89651

*Sarah Mishriki, Abdel Rahman Abdel Fattah, Elvira Meleca, McMaster University, Hamilton, ON, Canada, Tobias Kammann, Friedrich Schiller University Jena, Jena, Jena, Germany, Rakesh Sahu, Fei Geng, McMaster University, Hamilton, ON, Canada, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

**9:58am** Biofabrication of Zonally-Stratified Construct for Cartilage Repair

Technical Presentation. IMECE2018-89682

*Yang Wu, Penn State University, State College, PA, United States, Aman Dhawan, Penn State University, Hershey, PA, United States, Ibrahim Ozbolat, Penn State Univ, University Park, PA, United States*

**10:19am** A new aspiration-assisted bioprinting technique for tissue biofabrication

Technical Presentation. IMECE2018-89799

*BUGRA AYAN, Dong Nyoung Heo, Madhuri Dey, Adomas Pavilianskas, Zhifeng Zhang, Mecit Altan Alioglu, Corina S Drapaca, Penn State University, University Park, PA, United States, Ibrahim Ozbolat, Penn State Univ, University Park, PA, United States*

## **4-7 BIOMEDICAL DEVICES**

**4-7-1 Detection and Monitoring Biomedical Devices**

**Room 310 8:55am - 10:40am**

Session Chair: **Margaret Nowicki**, United States Military Academy, West Point, NY, United States

Session Co-Chair: **Chao Liang**, Praxair, Inc., Tonawanda, NY, United States

**8:55am** Design and Validation of a Low-Cost Non-Invasive Device to Detect Overnight Hypoglycemia

Technical Paper Publication. IMECE2018-86009

*Jonathan Lesko, Stephen Seibert, Wilkes University, Wilkes-Barre, PA, United States, Yong Zhu, Wilkes University, Wilkes Barre, PA, United States*

**9:16am** Design and Validation of a Low-Cost Heart Health Monitoring Device

Technical Paper Publication. IMECE2018-86031

*Nuzhat Ahmed, Lucas Kline, Wilkes University, Wilkes-Barre, PA, United States, Yong Zhu, Wilkes University, Wilkes Barre, PA, United States*

**9:37am** A Numerical Study of the Influence of Different Factors on Mechanical Characterization of Tumors via a 2D Tactile Sensor

Technical Paper Publication. IMECE2018-87669

*Zhili Hao, Cristina Genoese-Zerbi, Old Dominion University, Virginia Beach, VA, United States, James Jobe, Old Dominion University, Williamsburg, VA, United States, Kylee Kohl, Old Dominion University, Virginia Beach, VA, United States, Nathan Abshier, Timothy Watjen, Old Dominion University, Norfolk, VA, United States, Charles Tison, Old Dominion University, Virginia Beach, VA, United States*

**9:58am Smartphone-Based Device for Monitoring Chemical Pollutants in Water**

Technical Paper Publication. IMECE2018-86893

*Samuel Ozeh, Purdue University Northwest, Hammond, IN, United States, A. G. Agwu Nnanna, University of Texas of the Permian Basin, Odessa, TX, United States, Justus C. Ndukaife, Vanderbilt University, Nashville, TN, TN, United States*

**10:19am A Small Radio Frequency Sensor for Microwave Tumor Ablation**

Technical Paper Publication. IMECE2018-86766

*LULU WANG, Hefei University of Technology, Hefei, China, Mengke Ge, Bensheng Qiu, University of Science and Technology of China, Hefei, China*

**4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS**

**4-10-4 Biomedical Modeling IV**

**Room 311 8:55am - 10:40am**

Session Chair: **Shanzhong (shawn) Duan, Saint Martin's University, Lacey, WA, United States**

Session Co-Chair: **Chao Liang, Praxair, Inc., Tonawanda, NY, United States**

**8:55am Monte Carlo Simulation of the Laser-Induced Temperature Dynamics in Very Thin Scattering and Absorbing Biological Layer Piles**

Technical Paper Publication. IMECE2018-86545

*Reginald Eze, City University of New York, Long Island City, NY, United States*

**9:10am Patellofemoral Pain Syndrome: Sensitivity Analysis of Muscle Parameters for Expedited Recovery Utilizing an OpenSim Model for Lower Extremities**

Technical Paper Publication. IMECE2018-87042

*Adam Novotny, Manish Paliwal, The College of New Jersey, Ewing, NJ, United States*

**9:25am Computational Modeling of Coagulopathy for Decision Support**

Technical Paper Publication. IMECE2018-87683

*Brandon Saltsman, Carey Balaban, Jeffrey S Vipperman, University of Pittsburgh, Pittsburgh, PA, United States*

**9:40am A Stochastic Finite Element Method for Simulating Trabecular Bone**

Technical Paper Publication. IMECE2018-87869

*Saif Alrafeek, James R. Jastifer, Western Michigan University, Kalamazoo, MI, United States, Peter A. Gustafson, Western Michigan University, Kalamazoo, MI, United States*

**9:55am A Biomechanical and Thermal Analysis for Bone Augmentation of the Proximal Femur**

Technical Paper Publication. IMECE2018-88583

*Amirhossein Farvardin, Mahsan Bakhtiarinejad, Michael Pozin, Johns Hopkins University, Baltimore, MD, United States, Mehran Armand, Johns Hopkins University, Applied Physics Laboratory, Baltimore, MD, United States*

**10:10am Thermal Analysis of Marginal Conditions to Facilitate Cryopreservation by Vitrification**

Technical Presentation. IMECE2018-89607

*Purva Joshi, Yoed Rabin, Carnegie Mellon University, Pittsburgh, PA, United States*

**4-14 BIOTRANSPORT (FLUID, HEAT AND MASS)**

**4-14-1 Biotransport**

**Third Floor, David L. Lawrence Convention Center, Room 315 8:55am - 10:40am**

Session Chair: **Anne Schmitz, Gannon University, Erie, PA, United States**

Session Co-Chair: **Cahit A Evrensel, Ankara University, Ankara, Select State/Province, Turkey**

**8:55am Efficient Uncertainty Quantification for Biotransport in Tumors With Uncertain Material Properties**

Technical Paper Publication. IMECE2018-86216

*Alen Alexanderian, William Reese, Ralph C. Smith, North Carolina State University, Raleigh, NC, United States, Meilin Yu, University of Maryland Baltimore County, Baltimore, MD, United States*

**9:16am Influence of Non-Newtonian Rheology on Mass Transfer From a Biofluid in Separated and Reattached Flows**

Technical Paper Publication. IMECE2018-86809

*Khaled J. Hammad, Central Connecticut State University, Simsbury, CT, United States*

**9:37am CFD Model of White Thrombus Formation by High Shear Blood Flows with Consideration of Transport Process of Concentration and Aggregation Process, and Related Thrombus Visualization**

Technical Presentation. IMECE2018-88379

*Masaaki TAMAGAWA, Kyushu Inst of Technology, Kitakyushu, Japan*

**9:58am Optimum Frequency Range For Enhancing Cough Clearance Through Flow Oscillations**

Technical Presentation. IMECE2018-89987

*Duygu L Tuna, Altay Ünal, Fikret Ari, Ankara University, Ankara, Select State/Province, Turkey, Peter Krumpel, University of Nevada, Reno, NV, United States, Cahit A Evrensel, Ankara University, Ankara, Select State/Province, Turkey*

**10:19am Electrokinetic Remediation of Contaminated Soils With Chromium**

Technical Paper Publication. IMECE2018-87552

*André Ribeiro, Jorge Araújo, CVR - Centro para a Valorização de Resíduos, Guimarães, Select State/Province, Portugal, Cândida Vilarinho, Joana Carvalho, Mechanical Engng Department University of Minho, Guimarães, Select State/Province, Portugal*

Draft Program

## 4-2 DAMAGE BIOMECHANICS

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### 4-2-3 Damage Biomechanics III: Materials Characterization, Modeling and Analysis

Third Floor, David L. Lawrence Convention Center,  
Room 308 10:50am - 12:35pm

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Session Chair: **Sikhanda S Satapathy**, *ARL WMRD, APG, MD, United States*

Session Co-Chair: **Karim Muci-Kuchler**, *South Dakota School of Mines and Technology, Rapid City, SD, United States*

#### 10:50am Brain Tissue Material and Damage Properties for Blast Trauma

Technical Paper Publication. IMECE2018-88419

**Soroush Assari, Kurosh Darvish**, *Temple University, Philadelphia, PA, United States*

#### 11:05am Characterization of Injured Brain Tissue after Controlled Cortical Impact (CCI) using a mouse model

Technical Presentation. IMECE2018-86109

**Suhao Qiu**, *Shanghai Jiao Tong University, Shanghai, China*, **Wei Chen, Shanshan Qiu, Jianfeng Zeng, Mingyuan Gao, Luyang Tao**, *Soochow University, Suzhou, China*, **Ankush Aggarwal**, *Swansea University, Swansea, United Kingdom*, **Chung-Hao Lee**, *University of Oklahoma, Norman, OK, United States*, **Yuan Feng**, *Shanghai Jiao Tong University, Shanghai, China*

#### 11:20am A Comparison Of Neuronal Membrane Mechanoporation Strain Behavior For Dipalmitoyl phosphatidylcholine (DLPC) And 1-Palmitoyl-2-Oleoyl phosphatidylcholine (POPC) Phospholipids

Technical Presentation. IMECE2018-89831

**Folly Crawford, Michael Murphy**, *Mississippi State University, Starkville, MS, United States*, **S. Mun**, *Mississippi State University, Mississippi State, MS, United States*, **R.K. Prabhu**, *Mississippi State University, Starkville, MS, United States*

#### 11:35am Failure and Damage of Mineralized Tissue under Tension

Technical Presentation. IMECE2018-89207

**Rizacan Sarikaya, Anil Misra**, *University of Kansas, Lawrence, KS, United States*

#### 11:50am A Non-Linear Multi-Axial Fatigue Damage Model for the Intervertebral Disc Annulus

Technical Presentation. IMECE2018-89755

**Adhitya Vikraman Subramani**, *The Pennsylvania State University, University Park, PA, United States*, **Shruti Motiwale**, *Tesla Motors, Palo Alto, CA, United States*, **Xianlian Zhou**, *CFDRC, Huntsville, AL, United States*, **Reuben Kraft**, *Pennsylvania State University, University Park, PA, United States*

#### 12:05pm Towards a better understanding of optic nerve biomechanics using a multimaterial finite element model

Technical Presentation. IMECE2018-89874

**Rika Carlsen**, *Robert Morris University, Moon Township, PA, United States*, **Anirban Jana**, *Pittsburgh Supercomputing Center, Carnegie Mellon University, Pittsburgh, PA, United States*

## 4-5 BIOMATERIALS AND TISSUE: MODELLING, SYNTHESIS, FABRICATION AND CHARACTERIZATION

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### 4-5-2 Biomaterials and Tissue II: Modelling

Third Floor, David L. Lawrence Convention Center,  
Room 309 10:50am - 12:35pm

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Session Chair: **Seyed Allameh**, *Northern Kentucky Univ, Newport, KY, United States*

Session Co-Chair: **Karen Chang Yan**, *The College of New Jersey, Ewing Township, NJ, United States*

#### 10:50am Cellular Automaton and Finite Element Hybrid Simulation to Predict Axonal Extension Enhancement of Nerve Cell Under Mechanical Stimulation

Technical Paper Publication. IMECE2018-86653

**Shota Takeda, Yoshihiro Tomita**, *Doshisha University, Kyoto, Japan*, **Eiji Nakamachi**, *Doshisha Univ, Kyotanabe, Kyoto, Japan*

#### 11:11am Some Considerations for Hyperelastic Modeling of the Brain Tissue

Technical Presentation. IMECE2018-87072

**Aref Samadi-Dooki**, *Louisiana State University, Baton Rouge, LA, United States*, **George Voyiadjis**, *Louisiana State Univ, Baton Rouge, LA, United States*

#### 11:32am On Continuum Based Multiscale Modelling of Engineered Soft Tissue Constructs

Technical Paper Publication. IMECE2018-88482

**Karen Chang Yan**, *The College of New Jersey, Ewing Township, NJ, United States*, **Jacob Behneisen**, *The College of New Jersey, Lebanon, NJ, United States*

#### 11:53am Brazier Buckling in Grain Stems: Modeling and Understanding the Role of Functional Grading and Other Structural Characteristics

Technical Presentation. IMECE2018-89062

**Christopher Stubbs**, *New York University, Brooklyn, NY, United States*, **Wenhuan Sun**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Douglas D. Cook**, *Brigham Young University, Provo, UT, United States*

#### 12:14pm Nonlinear contact mechanics for the indentation of cellular cylindrical bodies

Technical Presentation. IMECE2018-89082

**Amy Dagro**, *Johns Hopkins University/ HEMI, Baltimore, MD, United States*, **K.T. Ramesh**, *Johns Hopkins Univ, Baltimore, MD, United States*

## 4-7 BIOMEDICAL DEVICES

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### 4-7-2 Surgical Assistive Devices

Room 310 10:50am - 12:35pm

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Session Chair: **LULU WANG**, *Hefei University of Technology, Hefei, China*

Session Co-Chair: **Maurizio Manzo**, *University of North Texas, Denton, TX, United States*

**10:50am** Pre-Surgical Planning of Screw-Position Arrangement for the Femur Fractures With a Custom APP

Technical Paper Publication. IMECE2018-86013

**Chen-Yuan Chung**, National Central University, Taoyuan City, Taiwan, **Jiing-Yih Lai**, National Central University, Taiwan 320, Taiwan, **He-Kai Young**, **Han-Yuan Gao**, National Central University, Taoyuan City, Taiwan

**11:11am** Biomedical Devices Using Shape Memory Polymer Foams for Treatment of Intracranial Aneurysms

Technical Paper Publication. IMECE2018-86120

**Jingyu Wang**, **Jishan Luo**, **Robert Kunkel**, **Yingtao Liu**, University of Oklahoma, Norman, OK, United States, **Bradley Bohnstedt**, University of Oklahoma, Oklahoma City, OK, United States, **Chung-Hao Lee**, University of Oklahoma, Norman, OK, United States

**11:32am** Modified Laparoscopic Tool for Enhanced Haptic Feedback

Technical Paper Publication. IMECE2018-86345

**Rajesh Kumar**, **Sudipto Mukherjee**, Indian Institute of Technology Delhi, New Delhi, India

**11:53am** A Novel Stent Graft that Contains Superelastic Nitinol and Ultra-Stretchable ePTFE for the Hemorrhage Control

Technical Presentation. IMECE2018-87829

**Moataz Elsisy**, **Yanfei Chen**, **Bryan Tillman**, **Catherine Go**, **Sung Kwon Cho**, **William Clark**, **Tae hur**, **Yicheng Ding**, **Youngjae Chun**, University of Pittsburgh, Pittsburgh, PA, United States

**12:14pm** Demonstration and Experimental Validation of Plastic-Encased Resonant Ultrasonic Piezoelectric Actuator for MRI-Guided Surgical Robots

Technical Paper Publication. IMECE2018-87963

**Paulo Carvalho**, **Christopher Nycz**, **Katie Gandomi**, **Gregory Fischer**, Worcester Polytechnic Institute, Worcester, MA, United States

## 4-10 COMPUTATIONAL MODELING IN BIOMEDICAL APPLICATIONS

### 4-10-5 Biomedical Modeling V

Room 311 10:50am - 12:35pm

Session Chair: **Shanzhong (shawn) Duan**, Saint Martin's University, Lacey, WA, United States

Session Co-Chair: **Chao Liang**, Praxair, Inc., Tonawanda, NY, United States

**10:50am** The Wisdom of Crowds Approach to Influenza-Rate Forecasting

Technical Paper Publication. IMECE2018-86559

**Jeff Morgan**, Joint Research and Development, Inc., Stafford, VA, United States, **Otto Wilson**, The Catholic University of America, Washington, DC, United States, **Prahlad Menon**, University of Pittsburgh, Pittsburgh, PA, United States

**11:11am** Non-Linear Analysis of Bio-Structures Through Refined Beam Models

Technical Paper Publication. IMECE2018-86848

**Daniele Guarnera**, **Erasmus Carrera**, **Ibrahim Kaleel**, **Alfonso Pagani**, Politecnico di Torino, Torino, Italy, **Marco Petrolo**, Politecnico di Torino, Turin, Italy

**11:32am** Differential Plate Lengths in Long Bone Fixation Can Increase Peak Strains

Technical Presentation. IMECE2018-87557

**David Jordan**, **Mark Miller**, University of Pittsburgh, Pittsburgh, PA, United States, **Alexander Kharlamov**, Allegheny General Hospital, Pittsburgh, PA, United States

**11:53am** "Modeling Heat Regulation With a Structured Mesh, Finite Volume Approach in a Voxelized Domain"

Technical Paper Publication. IMECE2018-88036

**Rohan Amare**, **Steven Eckels**, **Amir Bahadori**, Kansas State University, Manhattan, KS, United States

**12:14pm** Analysis of Temperature in Surgical-Drilling of Ex-vivo Human Femurs using Probabilistic Approach

Technical Presentation. IMECE2018-88811

**Pandithevan Ponnusamy**, IIITD&M Kancheepuram, Chennai, Tamilnadu, India, **Prasannavenkadesan Varatharajan**, Indian Institute of Information Technology Design and Manufacturing Kancheepuram, Chennai, Tamilnadu, India, **Vinayaga Muruga Pandey Natarajan**, IIITDM Kancheepuram, Chennai, Tamilnadu, India

## 4-14 ELECTROTRANSPORT, FLUID, HEAT AND MASS

### 4-14-2 Heat Transfer and Fluid

Third Floor, David L. Lawrence Convention Center, Room 315 10:50am - 12:35pm

Session Chair: **X. Gary Tan**, U.S. Naval Research Lab, Washington, DC, United States

Session Co-Chair: **Anne Schmitz**, Gannon University, Erie, PA, United States

**10:50am** Numerical Investigation of Heat Transfer in Tissues During Therapeutic Hyperthermia

Technical Paper Publication. IMECE2018-86485

**Saeed Tiari**, **Mahboobe Mahdavi**, **Kinjalkumar Chauhan**,  **Davide Piovesan**, Gannon University, Erie, PA, United States

**11:11am** Investigation of Radio-frequency Rewarming as a Means to Reduce Thermomechanical Stress During Ice-Free Rewarming from Cryopreservation Storage

Technical Presentation. IMECE2018-89224

**Prem Solanki**, **Yoed Rabin**, Carnegie Mellon University, Pittsburgh, PA, United States

**11:32am** Review of Diffusive Transport in the Vitreous Humor: Experimental and Analytical Studies

Technical Presentation. IMECE2018-89421

**Anita Penkova**, **Satwindar Sadhal**, University of Southern California, Los Angeles, CA, United States

**11:53am Thermal Conductivity of Cryoprotective Agents in the Presence of Silica-Coated and Uncoated Iron-Oxide Nanoparticles**

**Technical Presentation.** IMECE2018-89584

*Lili Ehrlich, Carnegie Mellon University, Pittsburgh, PA, United States, Zhe Gao, University of Minnesota, Minneapolis, MN, United States, John Bischof, Univ Of Minnesota, Minneapolis, MN, United States, Yoed Rabin, Carnegie Mellon University, Pittsburgh, PA, United States*

## **4-2 DAMAGE BIOMECHANICS**

**4-2-2 Damage Biomechanics II: Ballistic Impact and Blast Effects and Analysis**

**Third Floor, David L. Lawrence Convention Center, Room 308 2:05pm - 3:50pm**

Session Chair: **Reuben Kraft**, *The Pennsylvania State University, University Park, PA, United States*

Session Co-Chair: **Ashfaq Adnan**, *University of Texas Arlington, Arlington, TX, United States*

**2:05pm The Strain Rates of the Brain and Skull Under Dynamic Loading**

**Technical Paper Publication.** IMECE2018-88300

*Mohammad Hosseini Farid, Ashkan Eslaminejad, Mohammadreza Ramzanpour, Mariusz Ziejewski, Ghodrat Karami, North Dakota State University, Fargo, ND, United States*

**2:20pm Computational Analysis for Validation of Blast Induced Traumatic Brain Injury and Protection of Combat Helmet**

**Technical Paper Publication.** IMECE2018-87689

*X. Gary Tan, U.S. Naval Research Lab, Washington, DC, United States, Amit Bagchi, U.S. Naval Research Laboratory, Washington, DC, United States*

**2:35pm Indent Depth in the Clay Backing for Ceramic Armor**

**Technical Paper Publication.** IMECE2018-88284

*Timothy Zhang, Sikhanda S Satapathy, ARL WMRD, APG, MD, United States*

**2:50pm Development of an Experiment to Visualize Air Flow into Ballistics Gelatin Targets Shot with Small Caliber Projectiles**

**Technical Presentation.** IMECE2018-89706

*Karim Muci-Kuchler, Steven Dixler, Aaron Bost, South Dakota School of Mines and Technology, Rapid City, SD, United States*

**3:05pm A Multiscale Approach to Model Mechanoporation Damage in Neurons**

**Technical Presentation.** IMECE2018-89588

*A.H. Bakhtiary, Mississippi State University, Mississippi State, MS, United States, Michael Murphy, Mississippi State University, Starkville, MS, United States, M. D. Jones, Cardiff University, Cardiff, Wales, D. Bammann, R.K. Prabhu, Mississippi State University, Starkville, MS, United States*

**3:20pm Mapping Combat Helmet Design and Operational Parameter Trade Spaces Based on Ballistic Threats and Head Injury Severity**

**Technical Presentation.** IMECE2018-86725

*Peter Matic, Robert Saunders, U.S. Naval Research Laboratory, Washington, DC, United States*

## **4-5 BIOMATERIALS AND TISSUE: MODELLING, SYNTHESIS, FABRICATION AND CHARACTERIZATION**

**4-5-3 Biomaterials and Tissue III: Sythesis and Characterization**

**Third Floor, David L. Lawrence Convention Center, Room 309 2:05pm - 3:50pm**

Session Chair: **Karen Chang Yan**, *The College of New Jersey, Ewing Township, NJ, United States*

Session Co-Chair: **Anil Saigal**, *Tufts University, Medford, MA, United States*

**2:05pm Development of Chemotherapy System Using Plasma Activated Medium to Enhance PC12 Axonal Extension**

**Technical Paper Publication.** IMECE2018-86630

*Takanobu Haccho, Hiroshi Ichikawa, Koji Yamamoto, Yusuke Morita, Doshisha University, Kyoto, Japan, Eiji Nakamachi, Doshisha Univ, Kyotanabe, Kyoto, Japan*

**2:20pm Development of Three-Dimensional DC Electric Field Stimulation Bio Reactor for Axonal Outgrowth Enhancement**

**Technical Paper Publication.** IMECE2018-86637

*Shohei Tanaka, Ryota Sakiyama, Yusuke Morita, Koji Yamamoto, Doshisha University, Kyoto, Japan, Eiji Nakamachi, Doshisha Univ, Kyotanabe, Kyoto, Japan*

**2:35pm Development of Stretch Stimulation Device for Three-Dimensional Culture of PC12 Cells**

**Technical Paper Publication.** IMECE2018-86643

*Madoka Imura, Ryota Sakiyama, Yusuke Morita, Koji Yamamoto, Doshisha University, Kyoto, Japan, Eiji Nakamachi, Doshisha Univ, Kyotanabe, Kyoto, Japan*

**2:50pm Design and Fabrication of Pneumatic Soft Gripper**

**Technical Paper Publication.** IMECE2018-86648

*Zhonghua Guo, Xiaoning Li, Zhongsheng Sun, Nanjing University of Science and Technology, Nanjing, Jiangsu, China*

**3:05pm Folding Artificial Mucosa with Cell-Laden Hydrogels Guided by Mechanics Models**

**Technical Presentation.** IMECE2018-89290

*Honfei Chan, Hongkong city university, Hongkong, China, Ruike Zhao, Xuanhe Zhao, MIT, Cambridge, MA, United States*

**3:20pm**      **Biomaterial Models Adjustment and Comparison for Ultra-High Molecular Weight Polyethylene in Finite Element Models**

Technical Paper Publication. IMECE2018-87719

**HUMBERTO CORRO HERNANDEZ**, UNIVERSIDAD DE GUANAJUATO, GUANAJUATO, Mexico, **AGUSTIN VIDAL-LESSO**, UNIVERSIDAD DE GUANAJUATO-DICIS, SALAMANCA, Mexico, **Elias Ledesma**, **Antonio de Jesus Balvantin Garcia**, University of Guanajuato, Salamanca, Mexico

**4-7 BIOMEDICAL DEVICES**

**4-7-3 Fluid and Microfluid Biomedical Devices**

**Room 310**      **2:05pm - 3:50pm**

Session Chair: **Chao Liang**, Praxair, Inc., Tonawanda, NY, United States

Session Co-Chair: **Margaret Nowicki**, United States Military Academy, West Point, NY, United States

**2:05pm**      **DESIGN OF FORWARD-LOOKING INTRAVASCULAR ULTRASONIC TRANSDUCER FOR MICROBUBBLE-MEDIATED THROMBOLYSIS**

Technical Presentation. IMECE2018-86464

**Ho-Wuk Kim**, **Jinwook Kim**, North Carolina State University, RALEIGH, NC, United States, **Huaiyu Wu**, **Xiaoning Jiang**, NC State University, Raleigh, NC, United States

**2:26pm**      **An Approach to Capture Humidity From Exhaled Air**

Technical Paper Publication. IMECE2018-86507

**Sandra Grau Bartual**, **Ahmed M. Al-Jumaily**, Auckland University of Technology, Auckland, New Zealand

**2:47pm**      **Canal Design for SLA Printing of Closed Geometries**

Technical Paper Publication. IMECE2018-87097

**Erin Petrosky**, **Anne Schmitz**, Gannon University, Erie, PA, United States

**3:08pm**      **Development of A Hybrid Blood Pump for Extracorporeal Blood Circulation Devices**

Technical Presentation. IMECE2018-87291

**Nahmkeon Hur**, **Sungwon Kang**, **Wonjung Kim**, Sogang University, Seoul, Korea (Republic)

**3:29pm**      **Continuous Cell Sorting by Dielectrophoresis in a Straight Microfluidic Channel**

Technical Paper Publication. IMECE2018-88156

**Yuhao Qiang**, **Jia Liu**, **Darryl Dieujuste**, **Katrina Ramsamoaj**, **Sarah E Du**, Florida Atlantic University, BOCA RATON, FL, United States

**4-9 CLINICAL APPLICATIONS OF BIOENGINEERING**

**4-9-1 Clinical Applications of Bioengineering I- Experimental Methods**

**Room 311**      **2:05pm - 3:50pm**

Session Chair: **Douglas E. Dow**, Wentworth Institute of Technology, Boston, MA, United States

Session Co-Chair: **Lara Thompson**, University of the District of Columbia, Washington, DC, United States

**2:05pm**      **Exploring Training Methodologies Towards the Improvement of Elderly Balance**

Technical Paper Publication. IMECE2018-86815

**Lara Thompson**, **Joao Augusto Renno Brusamolin**, University of the District of Columbia, Washington, DC, United States, **Jelani Guise**, University of the District of Columbia, Washington, DC, United States, **Mehdi Badache**, **Sandy Collado Estrada**, **Lonika Behera**, **Marzieh Savadkoobi**, **Tyra Coombs**, **Pablo Sanchez Guerrero**, University of the District of Columbia, Washington, DC, United States, **Devdas Shetty**, University of District of Columbia, Washington DC, DC, United States

**2:26pm**      **Investigation of Forces in Deep Hole Bone Drilling**

Technical Paper Publication. IMECE2018-87064

**JuEun Lee**, **Serena Chu**, **Craig L. Chavez**, University of the Pacific, Stockton, CA, United States

**2:47pm**      **A Clinical Experiment on Infant Applied Pressure During Breastfeeding**

Technical Paper Publication. IMECE2018-87674

**Lin Wang**, **Ziana Alotaibi**, University of Texas at Dallas, Richardson, TX, United States, **Donna Geddes**, University of Western Australia, Crawley, WA, Australia, **Fatemeh Hassanipour**, University of Texas at Dallas, Richardson, TX, United States

**3:08pm**      **In Situ Tension of the Digital Nerves**

Technical Presentation. IMECE2018-87835

**Patrick J Schimoler**, **Jacob Didesch**, **Peter Tang**, **Mark Carl Miller**, Allegheny General Hospital, Pittsburgh, PA, United States

**3:29pm**      **Experimental Study of Bio-Polymer Knee Implant**

Technical Paper Publication. IMECE2018-88479

**Maria Ramos Gonzalez**, University of Nevada, Las Vegas, North Las Vegas, NV, United States, **Brendan O'Toole**, University of Nevada Las Vegas, Las Vegas, NV, United States, **Zhiyong Wang**, University of Nevada, Las Vegas, Las Vegas, NV, United States

Draft Program

## 4-2 DAMAGE BIOMECHANICS

### 4-2-1 Damage Biomechanics I: Blunt Impact Effects and Analysis

Third Floor, David L. Lawrence Convention Center,  
Room 308 4:00pm - 5:45pm

Session Chair: **C.S. Florio**, *US Army ARDEC, Picatinny Arsenal, NJ, United States*

Session Co-Chair: **Amit Bagchi**, *U.S. Naval Research Laboratory, Washington, DC, United States*

#### 4:00pm Ranking of Biomechanical Metrics to Describe Human Response to Impact-Induced Damage

Technical Paper Publication. IMECE2018-88007

**Nicholas DeVogel**, **Anjishnu Banerjee**, *Medical College of Wisconsin, Milwaukee, WI, United States*, **Frank Pintar**, *Med College Of Wisconsin, Milwaukee, WI, United States*, **Narayan Yoganandan**, *Medical College Of Wisconsin and VA Medical Center, Milwaukee, WI, United States*

#### 4:15pm Computational Human Torso Model Validation for Frontal Blunt Trauma

Technical Paper Publication. IMECE2018-88382

**Carolyn Hampton**, *ORISE, Bel Air, MD, United States*, **Michael Kleinberger**, *ARL, Aberdeen Proving Ground, MD, United States*

#### 4:30pm Cerebrospinal Fluid and Spherically Convergent Shear Waves during Blunt Head Trauma

Technical Presentation. IMECE2018-88389

**Martin Ostoja-Starzewski**, *Univ of Illinois Urbana-Champaign, Urbana, IL, United States*, **Amit Madhukar**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **Ying Chen**, *Smullia Corp, Katy, TX, United States*

#### 4:45pm Computational Modeling of Blunt Impact to Head and Correlation of Biomechanical Measures With Medical Images

Technical Paper Publication. IMECE2018-88026

**X. Gary Tan**, *U.S. Naval Research Lab, Washington, DC, United States*, **Maria M. D'Souza**, *INMAS-India, New Dehli, India*, **Subhash Khushu**, *INMAS, New Dehli, Select State/Province, India*, **Raj K. Gupta**, *USMRMC, Fort Detrick, MD, United States*, **Virginia DeGiorgi**, *Naval Research Lab, Washington, DC, United States*, **Ajay K. Singh**, *INMAS-India, New Dehli, Select State/Province, India*, **Amit Bagchi**, *U.S. Naval Research Laboratory, Washington, DC, United States*

#### 5:00pm Monitoring Tissue Damage using Cloud-Based Brain Biomechanics

Technical Presentation. IMECE2018-89984

**Ritika Menghani**, *Penn State University, University Park, PA, United States*, **Reuben Kraft**, *The Pennsylvania State University, University Park, PA, United States*

#### 5:15pm Pelvic Injury Survival Analysis for a Finite Element Human Body Model Using Multiple Data Sets

Technical Paper Publication. IMECE2018-88447

**Caitlin Weaver**, *Wake Forest University, Center For Injury Biomecha, Winston Salem, NC, United States*, **Anna Miller**, *Washington University, Department of Orthopaedic Surgery, St. Louis, MO, United States*, **Joel Stitzel**, *Wake Forest University, Center For Injury Biomecha, Winston Salem, NC, United States*

## 4-5 BIOMATERIALS AND TISSUE: MODELLING, SYNTHESIS, FABRICATION AND CHARACTERIZATION

### 4-5-4 Biomaterials and Tissue IV: Sythesis and Characterization

Third Floor, David L. Lawrence Convention Center,  
Room 309 4:00pm - 5:45pm

Session Chair: **Anil Saigal**, *Tufts University, Medford, MA, United States*

Session Co-Chair: **Seyed Allameh**, *Northern Kentucky Univ, Newport, KY, United States*

#### 4:00pm Reproduction of Kinematic Behavior of Elastic Lamellae in the Thoracic Aortic Media

Technical Paper Publication. IMECE2018-87242

**Atsutaka Tamura**, **Yuya Kato**, *Tottori University, Tottori, Japan*

#### 4:21pm Mechanical Properties of the Human Elbow Bones Measured by Nanoindentation and Microindentation

Technical Paper Publication. IMECE2018-87406

**Dilpreet Singh**, **Pulak Mohan Pandey**, *Indian Institute of Technology Delhi, New Delhi, India*, **Dinesh Kalyanasundaram**, *Indian Institute of Technology Delhi, New Delhi, India*

#### 4:42pm Mechanical Property Determination of a Stereolithographic Resin Subjected to Compressive Loading

Technical Paper Publication. IMECE2018-87600

**Christian Fry**, **Adam Mihalko**, **Robert Michael**, **Davide Piovesan**, *Georgia Institute of Technology, Atlanta, GA, United States*

#### 5:03pm Correlation of Tumor Mechanical Rigidity to Cancer Stage and Chemotherapeutic Response

Technical Presentation. IMECE2018-89317

**Brian Bush**, *National Institute of Standards and Technology, Gaithersburg, MD, United States*

#### 5:24pm Self-folding microgels to form artificial capillary blood vessels and a mathematical model to decipher the dynamics of self-folding

Technical Presentation. IMECE2018-89784

**Chunxiao Cui**, **Devon Eichfeld**, **Sean Liu**, **Mingkun Wang**, *Drexel University, Philadelphia, PA, United States*, **Li-Hsin Han**, *Drexel University, Philadelphia, PA, United States*

## 4-6 SYMPOSIUM ON MECHANOBIOLOGY

### 4-6-1 Mechanobiology

Third Floor, David L. Lawrence Convention Center,  
Room 317 4:00pm - 5:45pm

Session Chair: **Hai-Chao Han**, *The University of Texas at San Antonio, San Antonio, TX, United States*

Session Co-Chair: **Zhangli Peng**, *University of Notre Dame, Notre Dame, IN, United States*

**4:00pm** Shear Stress Induced Calcium Dependent Nuclear Deformation in Epithelial Cells  
Technical Paper Publication. IMECE2018-87650  
*Deekshitha Jetta, Deepika Verma, Mohammad M. Maneshi, SUNY-Buffalo, Buffalo, NY, United States, Susan Z. Hua, State Univ Of Ny, Buffalo, NY, United States*

**4:21pm** Pneumatic Microfluidic Cell Compression Device  
Technical Presentation. IMECE2018-89141  
*Donghee Lee, Alek G. Erickson, University of Nebraska Medical Center, Omaha, NE, United States, Taesun You, Texas Department of Transportation, Houston, TX, United States, Andrew T. Dudley, University of Nebraska Medical Center, Omaha, NE, United States, Sangjin Ryu, University of Nebraska-Lincoln, Lincoln, NE, United States*

**4:42pm** A Multi-Physics Model for Mechanosensing in Cell Migration  
Technical Presentation. IMECE2018-89346  
*Bahador Marzban, University of Rhode Island, Kingston, RI, United States, HONGYAN YUAN, University of Rhode Island, Kingston, RI, United States*

**5:03pm** A Model for Cellular Mechanotransduction and Contractility at Finite Strain  
Technical Presentation. IMECE2018-89389  
*Nikolaos Bouklas, Cornell University, Ithaca, NY, United States, Selman Sakar, William Curtin, EPFL, Lausanne, Switzerland*

**5:24pm** A Coupled Reaction-Diffusion-Strain Model of Mesenchymal Stem Cell Differentiation into Osteoblasts  
Technical Presentation. IMECE2018-89761  
*Matthew Dolack, The Pennsylvania State University, State College, PA, United States*

## 4-7 BIOMEDICAL DEVICES

### 4-7-4 Rehabilitation and Treatment Devices

Room 310 4:00pm - 5:45pm

Session Chair: **Liandong Yu**, *Hefei University of Technology, Hefei, China*

Session Co-Chair: **Shan Hu**, *Iowa State University, Ames, IA, United States*

**4:00pm** Minimizing Pain in Below Knee Amputees Patients Wearing Prosthetic

Socket by Increasing Flexibility in Specific Relief Areas  
Technical Paper Publication. IMECE2018-86450  
*Gabi Nehme, Micheline Dib Nehme, Yousef Khalife, Antoun Chagoury, University of Balamand, El-Koura, Lebanon North, Lebanon*

**4:21pm** Development of a Passive Prosthetic Ankle With Slope Adapting Capabilities  
Technical Paper Publication. IMECE2018-86593  
*Sandesh G. Bhat, Sangram Redkar, Arizona State University, Mesa, AZ, United States, Thomas Sugar, ASU, Chandler, AZ, United States*

**4:42pm** Design of a Smart Glove Using Flexible Technology for Artificial Gripper  
Technical Paper Publication. IMECE2018-86620  
*Vidya Nandikolla, California State University, Northridge, CA, United States, Robin Bochen, Tristin Suhr, California State University Northridge, Northridge, CA, United States*

**5:03pm** Design and Prototype Development of a Reconfigurable Wheelchair With Stand-Sit-Sleep Configurations  
Technical Paper Publication. IMECE2018-87905  
*Sumit Desai, Shankar Mantha, Veermata Jijabai Technological Institute, Mumbai, Maharashtra, India, Vikas Phalle, Veermata Jijabai Technological Institute, Mumbai, Maharashtra, India, Sangram Patil, Veermata Jijabai Technological Institute, Mumbai, Maharashtra, India, Vishwadeep Handikherkar, Veermata Jijabai Technological Institute, Mumbai, India*

**5:24pm** Neural Network Modeling of Maximum Insertion Force of Bevel-Tip Surgical Needle  
Technical Paper Publication. IMECE2018-88383  
*Sai Tej Reddy Gouda Toloupe, Verissimo, Nuo Chen, Temple University, Philadelphia, PA, United States, Byoung-gook Loh, Hansung University, Seoul, Korea (Republic), Parsaoran Hutapea, Temple University, Philadelphia, PA, United States*

## 4-9 CLINICAL APPLICATIONS OF BIOENGINEERING

### 4-9-2 Clinical Applications of Bioengineering II

Room 311 4:00pm - 5:45pm

Session Chair: **Kalyani Nair**, *Bradley University, Peoria, IL, United States*

Session Co-Chair: **Li-Hsin Han**, *Drexel University, Philadelphia, PA, United States*

**4:00pm** Coupling Immunofluorescence and Optoelectrokinetic Technique for Escherichia Coli Detection and Quantification in Water  
Technical Paper Publication. IMECE2018-86749  
*Uzumma O. Ozeh, Purdue University Northwest, Hammond, IN, United States, A. G. Agwu Nnanna, University of Texas of the Permian Basin, Odessa, TX, United States, Justus C. Ndukaife, Vanderbilt University, Nashville, TN, TN, United States*

**4:21pm**            **Viscoelastic Properties of the L3-L4 Myofascial Tissue in Ankylosing Spondylitis Patients**

Technical Paper Publication. IMECE2018-87906

*Allison White, Hannah Abbott, Bradley University, Peoria, IL, United States, Alfonso Masi, University of Illinois College of Medicine, Peoria, IL, United States, Kalyani Nair, Bradley University, Peoria, IL, United States*

**4:42pm**            **Three-Dimensional Cephalometric Analysis Using Computed Tomographic Imaging**

Technical Paper Publication. IMECE2018-88259

*Prahlad Menon, Soroosh Sanatkhani, University of Pittsburgh, Pittsburgh, PA, United States*

**5:03pm**            **Deposition Control of a FDM 3D Printer Based Direct Writing System for Hydrogel Molding in Microfluidic Devices Fabrication**

Technical Paper Publication. IMECE2018-88267

*Karen Chang Yan, The College of New Jersey, Ewing Township, NJ, United States, Jacob Boyle, The College of New Jersey, Hillsdale, NJ, United States, Kristi Petersen, The College of New Jersey, Ewing, NJ, United States*

**5:24pm**            **A New Wideband Microwave Antenna for Breast Cancer Detection**

Technical Paper Publication. IMECE2018-87390

*LULU WANG, JINZHANG XU, Hefei University of Technology, Hefei, China*

**Design, Reliability, Safety, and Risk**

**MONDAY, NOVEMBER, 2**

**5-1 PRODUCT AND PROCESS DESIGN**

**5-1-1 Product and Process Design I**

**Third Floor, David L. Lawrence Convention Center, Room 303    9:45am - 11:30am**

Session Chair: **Daniele Regazzoni**, *University of Bergamo, Dalmine (BG), OO, Italy*

Session Co-Chair: **Pooya Mahmoudian**, *Haskel International, Burbank, CA, United States*

**9:45am**            **Method of Construction for High Cycle Fatigue Resistant Pressure Vessels in Hydrogen Service**

Technical Paper Publication. IMECE2018-86292

*Pooya Mahmoudian, Haskel International, Burbank, CA, United States*

**10:06am**            **An Empirically Determined Design Guideline for Rectangular Cross Section Nitinol Flexure Hinges With the Focus on Flexibility-Strength Trade-Off**

Technical Paper Publication. IMECE2018-86551

*Suat Coemert, Mar Olmeda, Julia Fuckner, Christoph Rehekampff, Sandra Vanessa Brecht, Tim Christian Lueth, Technical University of Munich, Garching bei Muenchen, Bavaria, Germany*

**10:27am**            **Comparing Contact Stress Estimates of Some Straight Bevel Gears With ISO 10300 Standards**

Technical Paper Publication. IMECE2018-86572

*Edward Osakue, Texas Southern Univ, Houston, TX, United States, Lucky Anetor, Nigerian Defence Academy, Nigeria, Kaduna, Nigeria*

**10:48am**            **A Method for Constructing Standard Involute Gear Tooth Profile**

Technical Paper Publication. IMECE2018-86573

*Edward Osakue, Texas Southern Univ, Houston, TX, United States, Lucky Anetor, Nigerian Defence Academy, Nigeria, Kaduna, Nigeria*

**11:09am**            **Introducing ISO to AGMA conversion factors for steel spiral bevel gears design under bending fatigue**

Technical Presentation. IMECE2018-89231

*Mehmet Onur OGULATA, Karamanoglu Mehmetbey University, KARAMAN, Turkey, Necdet GEREN, University of Cukurova, Adana, Turkey*

**5-5 PRODUCT OPTIMIZATION**

**5-5-1 Product Optimization I**

**Third Floor, David L. Lawrence Convention Center, Room 304    9:45am - 11:30am**

Session Chair: **Antonio Caputi**, *Università degli Studi di Bergamo, Dalmine (BG), Italy*

Session Co-Chair: **C.S. Florio**, *US Army ARDEC, Picatinny Arsenal, NJ, United States*

**9:45am**            **Structural Optimization of Truck Front-Frame Under Multiple Load Cases**

Technical Paper Publication. IMECE2018-86293

*Shuvodeep De, Karanpreet Singh, Berkan Alanbay, Rakesh Kapania, Virginia Tech, Blacksburg, VA, United States, Raymond Aguero, Metalsa, Roanoke, VA, United States*

**10:06am**            **Truss Design and Optimization Using Stress Analysis and NURBS Curves**

Technical Paper Publication. IMECE2018-87728

*Antonio Caputi, Università degli Studi di Bergamo, Dalmine (BG), Italy, Miri Weiss Cohen, Braude College of Engineering, Karmiel, OO, Israel, Davide Russo, University of Bergamo, Dalmine, Italy, Caterina Rizzi, University of Bergamo, Rho (MI), Italy*

**10:27am**            **Optimization Methods for Controlling Stresses at Contacting Surfaces of Interference Fit Assemblies Under Axial and Torsional Loads**

Technical Paper Publication. IMECE2018-88180

*C.S. Florio, US Army ARDEC, Picatinny Arsenal, NJ, United States*

**10:48am**            **A Novel Optimization Design Method of Additive Manufacturing Oriented Porous Structures**

Technical Paper Publication. IMECE2018-86952

*Jiaqi ZHAO, Ming Zhang, Yu ZHU, XIN LI, Leijie Wang, Tsinghua University, Beijing, China*

**Draft Program**

**11:09am**                      **Static Stress and Thermal Analysis of Connecting Rod using FE-Analysis**  
**Technical Presentation.** IMECE2018-88846  
*Lalit Kumar Choudhary, Delhi Technological University, Delhi, Delhi, India*

## **5-11 FAILURE AND FORENSIC ANALYSIS**

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### **5-11-1 Failure and Forensic Analysis**

**Third Floor, David L. Lawrence Convention Center, Room 305**      **9:45am - 11:30am**

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Session Chair: **John Wiechel**, *SEA, Limited, Columbus, OH, United States*

**9:45am**                      **Early Fault Warning of Spindle Based on the Adaptive Weighted Fuzzy Petri Net**  
**Technical Paper Publication.** IMECE2018-86042  
*Hai Li, Wei Wang, University Electronic Science Technology of china, Chengdu, China, Qingzhao Li, University of Electronic Science and Technology of China, Chengdu, China, Lei Fan, Pu Huang, University Electronic Science Technology of china, Chengdu, China*

**10:06am**                      **Test Results: Vehicle Responses to Simulated Drag Caused by Front Tire Tread Detachment; The Effect of Scrub Radius and Speed**  
**Technical Paper Publication.** IMECE2018-87609  
*Mark W. Arndt, Transportation Safety, Technologies, Inc., Phoenix, AZ, United States, Stephen Arndt, Safety Engineering and Forensic Analysis, Phoenix, AZ, United States*

**10:27am**                      **Life Prediction of L6 Steel using Strain-Life Curve and strain softening Phenomenon by means of Low Cycle Fatigue Testing**  
**Technical Presentation.** IMECE2018-88867  
*Sanket Inamdar, Bharat Forge Ltd, Pune, Maharashtra, India*

**10:48am**                      **Microstructure Characterization And Evaluation Of Mechanical Properties For Friction Welded EN-24 Alloy Steel**  
**Technical Presentation.** IMECE2018-89043  
*Vijay Gaikwad, Bharat Forge Ltd, KCTI., Pune, Mharashtra, India*

## **5-14 TESTING FOR PRODUCT RELIABILITY AND SAFETY**

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### **5-14-1 Testing for Product Reliability and Safety**

**Fourth Floor, David L. Lawrence Convention Center, Room 406**      **9:45am - 11:30am**

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Session Chair: **John Wiechel**, *SEA, Limited, Columbus, OH, United States*

**9:45am**                      **Sawing Status Prediction of Diamond Sawblade Sawing Concrete Based on the Characteristics of Material Composition**  
**Technical Paper Publication.** IMECE2018-86340  
*Shanshan Hu, Fan Yang, Zili Yang, Feixiang Xiong, Weiwei Shi, Hongqun Tang, Guangxi University, Nanning, Guangxi, China*

**10:06am**                      **Testing for AM Products with Recycled Filaments**  
**Technical Presentation.** IMECE2018-87112  
*Serdar Tumkor, Jonathan Holman, University of Pittsburgh, Johnstown, PA, United States*

**10:27am**                      **Product Design in a Global Economy**  
**Technical Paper Publication.** IMECE2018-87685  
*Dennis Guenther, Sea Limited, Columbus, OH, United States, Michael Arnett, SEA, Ltd., Elk Grove Village, IL, United States, Manuel Forero Rueda, S-E-A Limited, Elk Grove Village, IL, United States*

**10:48am**                      **Statistical Time Domain Feature Based Approach to Assess the Performance Degradation of Rotary Seals**  
**Technical Paper Publication.** IMECE2018-87857  
*Madhumitha Ramachandran, University of Oklahoma, Norman, OK, United States, Zahed Siddique, Univ Of Oklahoma, Norman, OK, United States*

**11:09am**                      **Considerations for Communications Systems in Underground Refuge Alternatives**  
**Technical Paper Publication.** IMECE2018-87952  
*Nicholas Damiano, The National Institute of Occupational Safety and Health, Pittsburgh, PA, United States, Chenming Zhou, The National Insitute of Occupational Safety and Health, Pittsburgh, PA, United States, Bruce Whisner, The National Institute for Occupational Safety and Health, Pittsburgh, PA, United States*

## **5-17 CRASHWORTHINESS, OCCUPANT PROTECTION, AND BIOMECHANICS**

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### **5-17-1 Structural Systems Crashworthiness**

**Fourth Floor, David L. Lawrence Convention Center, Room 405**      **9:45am - 11:30am**

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Session Chair: **Rudolf Reichert**, *George Mason University, Fairfax, VA, United States*  
Session Co-Chair: **Mohamed Ridha Baccouche**, *Ford, Ann Arbor, MI, United States*

**9:45am**                      **Experimental and Numerical Studies on Dynamic Mechanical Properties of Metal-Polymer Hybrid Materials**  
**Technical Paper Publication.** IMECE2018-86521  
*Yiben Zhang, Lingyu Sun, Lijun Li, Beihang University, Beijing, China, Taikun Wang, Yantao Wang, Henan Key Laboratory of Underwater Intelligent Equipment, Zhengzhou Electromechanical Engineering Re, Zhengzhou, China*

**10:06am**                      **Side Structure Integrity Research for Passenger Rail Equipment**  
**Technical Paper Publication.** IMECE2018-87700  
*Shaun Eshraghi, Michael Carolan, A. Benjamin Perlman, Volpe National Transportation Systems Center, Cambridge, MA, United States*

**10:27am** **Finite Element Analysis of the Passenger Rail Equipment Workstation Table Sled Test**  
Technical Paper Publication. IMECE2018-87751

*Shaun Eshraghi, Kristine Severson, Volpe National Transportation Systems Center, Cambridge, MA, United States, David Hynd, Transport Research Laboratory, Wokingham, Berkshire, United Kingdom, A. Benjamin Perlman, Volpe National Transportation Systems Center, Cambridge, MA, United States*

**10:48am** **Dynamic Energy Absorption Characteristics of Additively-Manufactured Macrolattice Materials**  
Technical Paper Publication. IMECE2018-88521

*Keivan Davami, Mehrdad Mohsenizadeh, Michael Munther, Tyler Palma, Lamar University, Beaumont, TX, United States*

**11:09am** **Numerical Study on Explosion Cutting Process of PMMA Plate and Key Factors Influence on Cutting Performance**  
Technical Paper Publication. IMECE2018-86793

*Lei Ge, Beihang University, Beijing, China, Yantao Wang, Hui-peng Hu, Henan Key Laboratory of Underwater Intelligent Equipment, Zhengzhou Electromechanical Engineering Re, Zhengzhou, China, Lijun Li, Yiben Zhang, Beihang University, Beijing, China*

## **5-1 PRODUCT AND PROCESS DESIGN**

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### **5-1-2 Product and Process Design II**

**Third Floor, David L. Lawrence Convention Center, Room 303 1:45pm - 3:30pm**

Session Chair: **Shuichi Fukuda**, *Kyoto University, Matsugasaki, Kyoto, Japan*

Session Co-Chair: **Sina Mohsenian**, *University of Massachusetts Lowell, Lowell, MA, United States*

**1:45pm** **The Automatic Basketball Rebound System**  
Technical Paper Publication. IMECE2018-86715

*Thomas Smith, California State University Northridge, Northridge, CA, United States, Vidya Nandikolla, California State University, Northridge, CA, United States*

**2:06pm** **Journal Bearing With Controllable Radial Clearance**  
Technical Paper Publication. IMECE2018-86748

*Shahrbanoo Farkhondeh Biabnavi, Cleveland State University, beachwood, OH, United States, Majid Rashidi, Cleveland State University, Pepper Pike, OH, United States*

**2:27pm** **Cross Sectional Area Changes due to Plastic Bending of Prismatic Bars**  
Technical Paper Publication. IMECE2018-87608

*Michael Zielinski, ROTOR CLIP CO INC, SOMERSET, NJ, United States, Ismail Soner Cinoglu, Lehigh University, Bethlehem, PA, United States*

**2:48pm** **Numerical Analysis of the Contribution of Shot Peening in the Fatigue Strength of Multipass Welded Joints**

Technical Paper Publication. IMECE2018-87720

*Unai Etxeberria, Mondragon Unibertsitatea, Mondragon Goi Eskola Politeknikoa J.M.A.S.Coop., Mondragon, Spain, Jon Ander Esnaola, Ibai Ulacia, Mondragon Unibertsitatea - Mondragon Goi Eskola Politeknikoa J.M.A. S.Coop., Mondragon, Spain, Done Ugarte, Iñigo Llavori, Miren Larrañaga, Mondragon Unibertsitatea, Mondragon, Seleccion por favor..., Spain, Arkaitz Lopez-Jauregi, Escuela Politécnica Superior, Mondragon Unibertsitatea, Mondragon, Seleccion por favor..., Spain*

**3:09pm** **Reactive nitrogen plasma spray coating of titanium nitride: plasma torch design and coating analysis**  
Technical Presentation. IMECE2018-88813

*Sina Mohsenian, University of Massachusetts Lowell, Lowell, MA, United States*

## **5-5 PRODUCT OPTIMIZATION**

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### **5-5-2 Product Optimization II**

**Third Floor, David L. Lawrence Convention Center, Room 304 1:45pm - 3:30pm**

Session Chair: **Miri Weiss Cohen**, *Braude College of Engineering, Karmiel, OO, Israel*

Session Co-Chair: **Victorita Radulescu**, *University POLITEHNICA of Bucharest, Bucharest, Romania*

**1:45pm** **Optimal Reaction Wrench Measuring Platform**  
Technical Paper Publication. IMECE2018-87057

*Rajesh Kumar, Aditya Jain, Jitendra Prasad Khatait, Indian Institute of Technology Delhi, New Delhi, India*

**2:06pm** **Systematic Study of the Effect of Non-Uniform Seal Stiffness on the Contact Stress in Flat-Faced Soft-Seated Spring Operated Pressure Relief Valves**  
Technical Paper Publication. IMECE2018-87926

*Alex Schimanowski, Arthur Seibel, Josef Schlattmann, Hamburg University of Technology, Hamburg, Germany*

**2:27pm** **Automotive Headlamp Design Optimization & Photometry Performance Improvement**  
Technical Presentation. IMECE2018-89120

*Girish Kerur, Sachin M Jadhao, Savitribai Phule Pune University, PUNE, Maharashtra, India*

**2:48pm** **Numerical modeling of the intelligent heating systems for living space**  
Technical Presentation. IMECE2018-89189

*Victorita Radulescu, University POLITEHNICA of Bucharest, Bucharest, Romania*

**Draft Program**

**3:09pm**      **Advanced Modeling and Experimental Validation of an Optimized Power Transformer Tank**  
Technical Paper Publication. IMECE2018-87769

*Hélder Fernando Gonçalves Mendes, Cristiano José Pereira Coutinho, Sérgio Manuel Oliveira Tavares, Luís Miguel Ribeiro Félix, Agostinho Emanuel Nunes Martins de Matos, Efaced Energia, Máquinas e Equipamentos Eléctricos, S.A., Porto, Porto, Portugal, José Filipe Bizarro Meireles, António Costa Marques Pinho, Joel Ricardo da Silva Teixeira, University of Minho, Guimarães, Portugal*

## **5-12 RELIABILITY METHODS**

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### **5-12-1 Reliability Methods**

**Third Floor, David L. Lawrence Convention Center, Room 305      1:45pm - 3:30pm**

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Session Chair: **Mohammad Pourgol-Mohammad**, JCI/ Sahand University of Technology, York, PA, United States

Session Co-Chair: **Xiaobin Le**, Wentworth Institute of Technology, Boston, MA, United States

**1:45pm**      **Applications of the Monte Carlo Method for Estimating the Reliability of Components Under Multiple Cyclic Fatigue Loadings**

Technical Paper Publication. IMECE2018-86130

*Xiaobin Le*, Wentworth Institute of Technology, Boston, MA, United States

**2:06pm**      **System Wear Life Estimation Under Uncertainty**

Technical Paper Publication. IMECE2018-87115

*Mohammad Pourmostafaei*, Sarand University of Technology, Tabriz, East Azarbaijan, Iran, **Mohammad Pourgol-Mohammad**, JCI/ Sahand University of Technology, York, PA, United States, **Mojtaba Yazdani**, **Hossein Salimi**, Sahand University of Technology, Tabriz, East Azarbaijan, Iran

**2:27pm**      **A Whole Operation Life Cycle Model of Gas Turbine Blades Under Multi-Physics Based on Variation of Blade Profile Parameters**

Technical Paper Publication. IMECE2018-87040

*Dengji Zhou*, Shanghai Jiao Tong Univ, Shanghai, China, *Tingting Wei*, Shanghai Jiao Tong University, Shanghai, China, *MA Shixi*, Shanghai Jiaotong University, Shanghai, China, *Huisheng Zhang*, Shanghai Jiao Tong Univ, Shanghai, China, *Zhenhua Lu*, Shanghai Jiao Tong University, Shanghai, China, *Shilie Weng*, Shanghai Jiao Tong Univ, Shanghai, China

**2:48pm**      **Reliability-Based Optimal Design of a Micro-Grid System Under Natural Disasters**

Technical Paper Publication. IMECE2018-88139

*Zhetao Chen*, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, *Zhimin Xi*, Rutgers University - New Brunswick, Piscataway, NJ, United States

**3:09pm**      **An Investigation for Operational Reliability Assessment of Rolling Bearings Using Ensemble Stacked Deep Auto-encoders**

Technical Presentation. IMECE2018-89518

*Qibin Wang*, *Xianguang Kong*, *Hongbo Ma*, *Lei Yin*, *Jiantao Chang*, *Yao Liu*, Xidian University, Xi'an, China

## **5-16 SAFETY IN TRANSPORTATION, AGRICULTURE, AND OFF-ROAD VEHICLES**

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**5-16-1 Safety in Transportation, Agriculture, and Off-Road Vehicles**

**Fourth Floor, David L. Lawrence Convention Center, Room 406      1:45pm - 3:30pm**

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Session Chair: **John Wiechel**, SEA, Limited, Columbus, OH, United States

**1:45pm**      **Road Guard: Innovative Use of Plastic Waste Material in Redesigning Road Curbs**

Technical Paper Publication. IMECE2018-86021

*Ebenezer Ahiati*, Kwame Nkrumah University Of Science And Technology, Kumasi, Select State/Province, Ghana

**2:06pm**      **Low-Cost Wi-Fi Navigation of Smart Wheelchairs**

Technical Paper Publication. IMECE2018-86277

*Wafa Batayneh*, Jordan University of Science and Technology, Irbid, OO, Jordan, *Khaled Hatamleh*, Jordan University of Science & Technology, Irbid, OO, Jordan, *Amjad Nusayr*, University of Houston Victoria, Victoria, All Countries, *Rama AIQuraan*, Jordan University of Science and Technology, Irbid, Jordan, *Aseel Al-Khaleel*, Jordan University of Science & Technology, Irbid, Jordan, *Ahmad Bataineh*, Jordan University of Science and Technology, Irbid, OO, Jordan

**2:27pm**      **Variable Braking Force Using Intelligent Twin Carpers**

Technical Paper Publication. IMECE2018-86594

*Ganesh Virayaga Sundaram*, Sri Venkateswara College of Engineering, Chennai, India, *Chidambaram Subramanian*, Centre for Tire Research, Blacksburg, VA, United States

**2:48pm**      **Optimal Design of a Conventional and Magnetorheological Fluid Brakes Using Sensitivity Analysis and Taguchi Method**

Technical Paper Publication. IMECE2018-86775

*Salwan Obaid Waheed Khafaji*, University of Missouri At Columbia. USA, Columbia, MO, United States, *Noah Manring*, University Of Missouri — Columbia, Columbia, MO, United States, *Mohammed Al-Mudhafar*, University of Missouri - Columbia, COLUMBIA, MO, United States

## **5-17 CRASHWORTHINESS, OCCUPANT PROTECTION, AND BIOMECHANICS**

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**5-17-2 Full Vehicle Crashworthiness and Occupants Protection**

**Fourth Floor, David L. Lawrence Convention Center, Room 405      1:45pm - 3:30pm**

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Session Chair: **Lingyu Sun**, Beihang University, Beijing, China

Session Co-Chair: **Mohamed Ridha Baccouche**, Ford, Ann Arbor, MI, United States

**1:45pm**      **Development of Structural Countermeasures for NHTSA's Oblique Impact**

**Technical Paper Publication.** IMECE2018-86684

*Rudolf Reichert, Cing-Dao (Steve) Kan, George Mason University, Fairfax, VA, United States*

**2:06pm**      **A new crashworthiness design method for complex vehicular structures using principal components analysis (PCA) and data mining**

**Technical Presentation.** IMECE2018-87703

*Xianping Du, Feng Zhu, Embry-Riddle Aeronautical University, DAYTONA BEACH, FL, United States*

**2:27pm**      **Finite Element Model Validation of the Hybrid-III Rail Safety (H3-RS) Anthropomorphic Test Device (ATD)**

**Technical Paper Publication.** IMECE2018-87736

*Shaun Eshraghi, Kristine Severson, Volpe National Transportation Systems Center, Cambridge, MA, United States, David Hynd, Transport Research Laboratory, Wokingham, Berkshire, United Kingdom, A. Benjamin Perlman, Volpe National Transportation Systems Center, Cambridge, MA, United States*

**2:48pm**      **Pedestrian Collision Responses Using Leg-form Impactor Subsystem and Full-Sized Pedestrian Model on Different Workbenches**

**Technical Paper Publication.** IMECE2018-87904

*obaidur rahman mohammed, Hamid Lankarani, Wichita State University, wichita, KS, United States, Shabbir Memon, Wichita State University, Wichita, KS, United States*

**3:09pm**      **A Peak-Selection RBF Mesh Morphing Method for Subject-Specific Child Occupant Modeling**

**Technical Paper Publication.** IMECE2018-88098

*Yunlei Yin, Wenxiang Dong, Chongqing university, Chongqing, China, Zhenfei Zhan, Chongqing University, Livonia, MI, United States, JunMing Li, Chongqing university, Chongqing, China*

## 5-1 PRODUCT AND PROCESS DESIGN

### 5-1-3 Product and Process Design III

**Third Floor, David L. Lawrence Convention Center, Room 303      3:45pm - 5:30pm**

Session Chair: **Anthony D Angelo, US Army ARDEC, Hillsborough, NJ, United States**

Session Co-Chair: **Olga Sankowski, Hamburg University of Technology, Hamburg, Hamburg, Germany**

**3:45pm**      **Effective Design Team Composition Using Individual and Group Cognitive Attributes**

**Technical Paper Publication.** IMECE2018-86888

*Kaitlyn Fritz, Oakland University, Rochester Hills, MI, United States, Line Deschenes, Oakland University Michigan, Rochester Hills, MI, United States, Vijitashwa Pandey, Oakland University, Rochester, MI, United States*

**4:06pm**      **Application of Moving Particle Simulation Method To Transmission Design Process**

**Technical Presentation.** IMECE2018-87310

*Chulmin Ahn, Hyundai Motor Group, Hwaseong-si, Gyeonggi-do, Korea (Republic)*

**4:27pm**      **Using Multi-Channel Human-System Interaction for User-Centered Product Design**

**Technical Paper Publication.** IMECE2018-88091

*Olga Sankowski, Dieter Krause, Hamburg University of Technology, Hamburg, Hamburg, Germany*

**4:48pm**      **Hand Design Selection For Precision Grasping Of Small Objects Based On Hand-object System Workspace**

**Technical Presentation.** IMECE2018-89640

*Roshan Kumar Hota, Indian Institute of Technology, Kharagpur, Kharagpur, West Bengal, India, Kumar Cheruvu, Indian Institute of Technology Kharagpur, Kharagpur, India*

**5:09pm**      **A Systems Engineering Approach to Incorporating the Internet of Things to Reliability-Risk Modeling for Ranking Conceptual Designs**

**Technical Paper Publication.** IMECE2018-86711

*Anthony D Angelo, US Army ARDEC, Hillsborough, NJ, United States, Edwin K.P. Chong, Colorado State University, Ft. Collins, CO, United States*

## 5-8 RELIABILITY AND RISK IN ENERGY SYSTEMS

### 5-8-1 Reliability and Risk in Energy Systems

**Third Floor, David L. Lawrence Convention Center, Room 304      3:45pm - 5:30pm**

Session Chair: **Guangdong Zhu, NREL, Englewood, CO, United States**

**3:45pm**      **A Novel Hybrid Strategy for Multimode Operation Mapping and Feature Extraction on Data-Driven Statistical Fault Detection Methods**

**Technical Paper Publication.** IMECE2018-87417

*Horacio Pinzon, Cinthia Audivet, Melitsa Torres, Marlon Conesuegra, Javier Alexander, Marco Sanjuan, Promigas, Barranquilla, Colombia*

**4:06pm**      **Seismic Probabilistic Risk Assessment of Nuclear Power Plants: 10 CFR 50.69 Assumptions and Sources of Uncertainty**

**Technical Paper Publication.** IMECE2018-87677

*Sara Lyons, U.S. Nuclear Regulatory Commission, Kensington, MD, United States, Shilp Vasavada, U.S. Nuclear Regulatory Commission, Washington, DC, United States*

**4:27pm**      **Life Assessment of Gas Turbine Blades Under Creep Failure Mechanism Considering Humidity**

**Technical Paper Publication.** IMECE2018-87883

*Bita Soltanmohammadlou, Sahand University of Technology, Tabriz, East Azarbaijan, Iran, Mohammad Pourgol-Mohammad, JCI/ Sahand University of Technology, York, PA, United States, Mojtaba Yazdani, Sahand University of Technology, Tabriz, East Azarbaijan, Iran*

**4:48pm Accelerated Degradation Testing of Rigid Wet Cooling Media to Analyse the Impact of Calcium Scaling**  
Technical Paper Publication. IMECE2018-88508

**Hemant Narayan Dakshinamurthy, Ashwin Siddarth**, University of Texas Arlington, ARLINGTON, TX, United States, **Abhishek Guhe**, Mestex, A Division of Mestek Inc., Dallas, TX, United States, **Rajesh Kasukurthy**, The University of Texas Arlington, Arlington, TX, United States, **James Hoverson**, Mestex, A Division of Mestek Inc., Dallas, TX, United States, **Dereje Agonafer**, University of Texas At Arlington, Arlington, TX, United States

**5:09pm Adhesion Durability in Photovoltaic Backsheets as a Function of Indoor Accelerated Weathering Exposure**  
Technical Presentation. IMECE2018-89704

**Scott Julien, Jianfeng Sun**, Northeastern University, Boston, MA, United States, **Yu Wang**, Case Western Reserve University, Cleveland, OH, United States, **Andrew Fairbrother, Xiaohong Gu**, National Institute of Standards and Technology, Gaithersburg, MD, United States, **Sophie Napoli**, Arkema, Inc., King of Prussia, PA, United States, **Liang Ji, Kenneth P. Boyce**, Underwriters Laboratories, LLC, Northbrook, IL, United States, **Michael Kempe**, National Renewable Energy Laboratory (NREL), Golden, CO, United States, **Roger H. French, Laura S. Bruckman**, Case Western Reserve University, Cleveland, OH, United States, **Gregory S. O'Brien, Adam W. Hauser**, Arkema, Inc., King of Prussia, PA, United States, **Kai Tak Wan**, Northeastern University, Boston, MA, United States

## 5-13 SAFETY, RISK AND RELIABILITY OF EMERGING TECHNOLOGIES

**5-13-1 Safety, Risk and Reliability of Emerging Technologies**

**Third Floor, David L. Lawrence Convention Center, Room 305 3:45pm - 5:30pm**

Session Chair: **Mohammad Purgol-Mohammad**, JCI/ Sahand University of Technology, York, PA, United States

Session Co-Chair: **Jeremy M. Gernand**, Pennsylvania State University, University Park, PA, United States

**3:45pm Examining Pulmonary Toxicity of Engineered Nanoparticles Using Clustering for Safe Exposure Limits**  
Technical Paper Publication. IMECE2018-87431

**Vignesh Ramchandran**, Penn State University, University Park, PA, United States, **Jeremy Gernand**, The Pennsylvania State University, Port Matilda, PA, United States

**4:06pm Limit Load Analysis of As-Fabricated Pipe Bends With Low Ovality Under In-Plane Closing Moment Loading and Internal Pressure**  
Technical Paper Publication. IMECE2018-88004

**Sherif Sorour, Mostafa Shazly**, The British University in Egypt, El Sherouk City, Other/Not Applicable, Egypt, **Mohammad Megahed**, Cairo University, Giza, Cairo, Egypt

**4:27pm Real-Time Fault Diagnosis of Rotating Machinery Based On Improved 1-D Convolutional Neural Network Under Noisy Environment**  
Technical Presentation. IMECE2018-88878

**Liu Xingchen, Qi Caizhou, Zhao Jiong, Shen Hehong, Xiong Xiaolei**, Tongji University, Shanghai, Shanghai, China

**4:48pm Flammability Risk Assessment of Mildly Flammable Refrigerant Leak from Roof Top Unit**  
Technical Presentation. IMECE2018-89011

**Ahmed Elatar, Ahmad Abu-Heiba, Mingkan Zhang**, Oak Ridge National Laboratory, Oak Ridge, TN, United States, **Kevin Dean Edwards**, Oak Ridge National Laboratory, Knoxville, TN, United States, **Viral Patel**, ORNL, Oak Ridge, TN, United States, **Van Baxter**, Oak Ridge National Laboratory, Oak Ridge, TN, United States, **Omar Abdelaziz**, Cleat Consulting, Dubai, United Arab Emir.

**5:09pm Uncertainty Optimization Design of Vehicle Wheel Made of Long Glass Fiber Reinforced Thermoplastic**  
Technical Paper Publication. IMECE2018-86769

**Daijun Hu, Yingchun Shan, Xiandong Liu**, Beihang University, Beijing, China, **Weihao Chai**, Beihang University, China, Beijing, China, **Xiaoyin Wang**, Pan Asia Technical Automotive Center Co., Ltd, Shanghai, China

## 5-16 SAFETY IN TRANSPORTATION, AGRICULTURE, AND OFF-ROAD VEHICLES

**5-16-2 Safety in Transportation, Agriculture, and Off-Road Vehicles**

**Fourth floor, David L. Lawrence Convention Center, Room 406 3:45pm - 5:30pm**

Session Chair: **John Wiechel**, SEA, Limited, Columbus, OH, United States

**3:45pm Vulnerability Analysis of Link-Weighted Shanghai Metrorail Transit Network**  
Technical Paper Publication. IMECE2018-86863

**Yanjie Zhang**, Tongji University, Shanghai, China, **Yalda Saadat**, University of Maryland college park, College Park, MD, United States, **Dongming Zhang**, Tongji University, Shanghai, China, **Bilal Ayyub**, University of Maryland college park, College Park, MD, United States, **Hongwei Huang**, Tongji University, Shanghai, China

**4:06pm "Design, Installation, and Validation of a Data Acquisition System"**  
Technical Paper Publication. IMECE2018-87071

**Yucheng Liu, Andrew LeClair, Matthew Doude, Reuben F. Burch V**, Mississippi State University, Mississippi State, MS, United States

Draft Program

**4:27pm**      **A Model Based Framework for Wheel Lock Simulation in a Brake Dynamometer Towards Heavy Road Vehicle Safety**

**Technical Paper Publication.** IMECE2018-87230

*Indeevar Shyam Lanka, Akhil Challa, Nithya Sridhar, Indian Institute of Technology Madras, Chennai, India, Sankarganesh Sankaralingam, Madras Engineering Industries Private Limited, Chennai, India, Shankar Coimbatore Subramanian, Indian Institute Of Technology, Madras, Chennai, Select State/Province, India, Gunasekaran Vivekanandan, Madras Engineering Industries Private Limited, Chennai, India*

**4:48pm**      **Post-Failure Recovery Strategies for Metro-rail Transit Networks With Washington D.C. As a Case Study**

**Technical Paper Publication.** IMECE2018-87471

*Yalda Saadat, University of Maryland college park, College Park, MD, United States, Yanjie Zhang, Tongji University, Shanghai, China, Dongming Zhang, Hongwei Huang, Tongji University, Shanghai, China, Bilal Ayyub, University of Maryland college park, College Park, MD, United States*

**5:09pm**      **Analytical Vehicle KANO Model Development**

**Technical Paper Publication.** IMECE2018-87825

*Jiaquan Chen, FAW, Rochester, MI, United States, Yin-ping Chang, Oakland University, Rochester, MI, United States*

## **TUESDAY, NOVEMBER, 13**

### **5-19 DESIGN, RELIABILITY, SAFETY, AND RISK PLenary**

**5-19-1 Design, Reliability, Safety, and Risk Plenary**

**Third Floor, David L. Lawrence Convention Center, Room 304      8:00am - 8:45am**

**8:00am**      **Autonomous Vehicle Safety: Tomorrow?s Rewards Versus Today?s Reality**

**Plenary Presentation.** IMECE2018-90096

*Roger MCCARTHY, McCarthy Engineering, Palo Alto, CA, United States*

### **5-1 PRODUCT AND PROCESS DESIGN**

**5-1-4 Product and Process Design IV**

**Third Floor, David L. Lawrence Convention Center, Room 303      10:00am - 11:45am**

Session Chair: **Giorgio Colombo, Politecnico Di Milano, Milano, Italy**

Session Co-Chair: **RAGAVANANTHAM SHANMUGAM, ANNA UNIVERSITY, CHENNAI, India**

**10:00am**      **Design and Development of a Low-Cost Roof Top Solar Ventilator**

**Technical Paper Publication.** IMECE2018-86997

*RAGAVANANTHAM SHANMUGAM, ANNA UNIVERSITY, CHENNAI, India, Umayakumar Vellaisamy, Larsen and Toubro Limited, CHENNAI, N/A, India, Karthikeyan Balasubramaniam, Wheels India Limited, Chennai, India, Sathishkumar Mani, Anna University, Chennai, Select State/Province, India*

**10:21am**      **A Small-Scale Robotic Spill Detection and Cleaning Method**

**Technical Paper Publication.** IMECE2018-87180

*Hussain F. Alsaif, Houssam Antar, Demetri Baker, Ashmita Tandon, Jack Manning, Guohua Ma, James McCusker, Wentworth Institute of Technology, Boston, MA, United States*

**10:42am**      **Unmanned Underwater Drone Design for Ocean Exploration**

**Technical Paper Publication.** IMECE2018-87649

*Rojitha Goonesekere, Yu Guo, Midwestern State University, Wichita Falls, TX, United States*

**11:03am**      **Nuclear Storage Cask Inspection Robotics As a Case Study in System Design Challenges**

**Technical Paper Publication.** IMECE2018-88374

*Jen Bracken, Sean N. Brennan, Ian Van Sant, The Pennsylvania State University, University Park, PA, United States, Cliff Lissenden, Pennsylvania State University, State College, PA, United States, Karl Reichard, Penn State Applied Research Laboratory, University Park, PA, United States*

**11:24am**      **The Improved Model of Particle Shape Prediction Considering a Choke-Level Effect for Cone Crashes**

**Technical Paper Publication.** IMECE2018-88603

*wei zhang, Wang Jixin, Jilin university, changchun, China, Yu Xiangjun, Kunming University, Kunming, China*

### **5-4 CAD, CAM AND CAE DESIGN**

**5-4-1 CAD, CAM and CAE Design I**

**Third Floor, David L. Lawrence Convention Center, Room 304      10:00am - 11:45am**

Session Chair: **Marco Rossoni, Politecnico di Milano, Milano, Italy**  
Session Co-Chair: **Yucheng Liu, Mississippi State University, Mississippi State, MS, United States**

**10:00am**      **Computational Design and Analysis of Nitinol-Based Arch Wedge Support**

**Technical Paper Publication.** IMECE2018-86287

*Tyler N. Stranburg, Yucheng Liu, Harish Chander, Adam Knight, Mississippi State University, Mississippi State, MS, United States*

**10:21am**      **Analysis of Reciprocating Seals in the Wet-Mate Electrical Connectors for Underwater Applications**

**Technical Paper Publication.** IMECE2018-86988

*Quan Han, Southeast University, Nanjing, China, Yan Zhang, Southeast University, Nanjing Jiangsu, China, Haiyang Chen, Juekuan Yang, Yunfei Chen, Southeast University, Nanjing, China*

**10:42am BIM INTEGRATION TO RAILWAY PROJECTS - CASE STUDY**

Technical Presentation. IMECE2018-88851

*Mounir Bensalah, Ibn Tofail University, ENSAK - Colas Rail Maroc, Casablanca, Morocco, Abdelmajid Elouadi, Hassan MHARZI, Ibn Tofail University, ENSAK, Kénitra, Select State/Province, Morocco*

**11:03am A Big Shift in Engineering: What Issues are Expected and How we Could Possibly Deal with them.**

Technical Presentation. IMECE2018-89170

*Shuichi Fukuda, Keio University, Minato-ku, Tokyo, Japan*

**11:24am An Algorithm for Similar 3D Model Difference Examination Using Geometric Matching**

Technical Paper Publication. IMECE2018-86996

*Lianshui Guo, Yue Yin, Beihang University, Beijing, China*

**5-10 GENERAL TOPICS ON RISK, SAFETY AND RELIABILITY**

**5-10-1 Topics on Safety and Hazard Analysis**

**Third Floor, David L. Lawrence Convention Center, Room 305 10:00am - 11:45am**

Session Chair: **Bin Zhou**, *FM Global, Norwood, MA, United States*

Session Co-Chair: **Arun Veeramany**, *Pacific Northwest National Laboratory, Richland, WA, United States*

**10:00am Occupational Safety Implications of the Changing Energy Mix**

Technical Paper Publication. IMECE2018-86678

*Jeremy Gernand, The Pennsylvania State University, Port Matilda, PA, United States*

**10:21am "Track Shape, Resulting Dynamics and Injury Rates of Greyhounds"**

Technical Paper Publication. IMECE2018-87156

*Fatemeh Mahdavi, Md Imam Hossain, Univrsity of Technology, Sydney, Sydney, NSW, Australia, Hasti Hayati, UTS, Sydney, NSW, Australia, Paul Kennedy, University of Technology Sydney (UTS), Sydney, NSW, Australia, David Eager, University of Technology Sydney, Sydney, NSW, Australia*

**10:42am Engineering a Pool Ladder to Prevent Drownings in Above-Ground Pools**

Technical Paper Publication. IMECE2018-87875

*William Pierce, Knott Laboratory, Centennial, CO, United States, Richard Ziernicki, Knott Laboratory Llc, Centennial, CO, United States*

**11:03am A Set of Preliminary Model Experiments for Studying Engineering Student Biases in the Assessment and Prioritization of Risks**

Technical Paper Publication. IMECE2018-87888

*Jeremy Gernand, The Pennsylvania State University, Port Matilda, PA, United States*

**11:24am Design and Testing of a Novel Human Vibration Measurement System to Analyze the Connection Between Vibration Exposure and Hearing Loss**

Technical Presentation. IMECE2018-89867

*Olivia Bridston, Gaelen Murray, Zac Oldham, Gonzaga University, Spokane, WA, United States*

**5-2 SOCIAL CONTEXT AWARE DESIGN**

**5-2-1 Social Context Aware Design**

**Third Floor, David L. Lawrence Convention Center, Room 303 1:45pm - 3:30pm**

Session Chair: **Shuichi Fukuda**, *Keio University, Minato-ku, Tokyo, Japan*

Session Co-Chair: **Marco Rossoni**, *Politecnico di Milano, Milano, Italy*

**1:45pm "Printed and 360 Head-Mounted Display Rendering: A Cross-Cultural Study Comparing Utility, Spatial Representation and Emotional Capabilities"**

Technical Paper Publication. IMECE2018-87163

*Juan-Carlos Rojas, Tecnológico de Monterrey, Monterrey, Nuevo León, Mexico, Juan Luis Higuera-Trujillo, Universitat Politècnica de València - I3B, Valencia, Valencia, Spain, Roberto Mora-Salinas, Tecnológico de Monterrey, Puebla, Puebla, Mexico, Jessica Galindo, Tecnológico de Monterrey, Puebla, Mexico, Susana Iñarra Abad, Universitat Politècnica de València - I3B, Valencia, Spain*

**2:06pm Binomial Parameter Estimation and Mapping for Demand Prediction: A Case Study of Bike Sharing Station Expansion Design**

Technical Paper Publication. IMECE2018-87865

*Bryan Watson, Cassandra Telenko, Georgia Institute of Technology, Atlanta, GA, United States*

**2:27pm Scalability Considerations in the Design of Microgrids to Support Socioeconomic Development in Rural Communities**

Technical Paper Publication. IMECE2018-88441

*Hailie Suk, University at Buffalo, State University, Buffalo, NY, United States, Abhishek Yadav, University of Oklahoma, Norman, OK, United States, John Hall, University At Buffalo, Buffalo, NY, United States*

**2:48pm Decision Making Under Severe Uncertainty In Engineering Projects**

Technical Presentation. IMECE2018-89744

*Sara Naranjo Corona, Oakland University, Clarkston, MI, United States, Vijitashwa Pandey, Judson Estes, Oakland University, Rochester, MI, United States*

**3:09pm From Customer Requirements to Detailed Design: How Do Product Data Change?**

Technical Paper Publication. IMECE2018-87900

*Marco Rossoni, Giorgio Colombo, Luca Bergonzi, Politecnico di Milano, Milano, Italy*

Draft Program

## 5-4 CAD, CAM AND CAE DESIGN

### 5-4-2 CAD, CAM and CAE Design II

Third Floor, David L. Lawrence Convention Center,  
Room 304 1:45pm - 3:30pm

Session Chair: **Daniele Regazzoni**, *University of Bergamo, Dalmine (BG), OO, Italy*

Session Co-Chair: **Jorge D. Camba**, *Purdue University, West Lafayette, IN, United States*

**1:45pm** A Study on Sampling Strategies to Determine the Variability of Parametric History-Based 3D CAD Models  
Technical Paper Publication. IMECE2018-87404

**Manuel Contero**, **Ferran Naya**, **David Pérez-López**, *Universitat Politècnica de València, Valencia, Please fill in the field, Spain*, **Pedro Company**, *Universitat Jaume I, Castellón, Castellón, Spain*, **Jorge D. Camba**, *Purdue University, West Lafayette, IN, United States*

**2:06pm** Motion Capture and Data Elaboration to Analyse Wheelchair Set-Up and Users' Performance  
Technical Paper Publication. IMECE2018-87531

**Daniele Regazzoni**, **Andrea Vitali**, *University of Bergamo, Dalmine (BG), OO, Italy*, **Caterina Rizzi**, *University of Bergamo, Rho (MI), Italy*, **Filippo Colombo Zefinetti**, *University of Bergamo, Dalmine (BG), Select State/Province, Italy*

**2:27pm** Research on a Multi-Fidelity Surrogate Model Based Model Updating Strategy  
Technical Paper Publication. IMECE2018-89424

**Ping Wang**, **Qingmiao Wang**, **Xin Yang**, *Chongqing University, Chongqing, China*, **Zhenfei Chen**, *Chongqing University, Livonia, MI, United States*

**2:48pm** Extending Model Based Definition (MBD) to Capture Product Behavior and Contextual Information using a Model Based Feature Information Network (MFIN)  
Technical Presentation. IMECE2018-89646

**Saikiran Gopalakrishnan**, *Purdue University - School of Aeronautics & Astronautics, West Lafayette, IN, United States*, **Kevin J. Del Re**, *Purdue University - Department of Computer Graphics Technology, West Lafayette, IN, United States*, **Daniel Campbell**, *Capvidia, Sugar Land, TX, United States*, **Rosemary As-theimer**, *Purdue University - Department of Computer Graphics Technology, West Lafayette, IN, United States*, **Michael D. Sangid**, *Purdue University - School of Aeronautics and Astronautics, West Lafayette, IN, United States*, **Nathan W. Hartman**, *Purdue University- Department of Computer Graphics Technology, West Lafayette, IN, United States*

**3:09pm** Identification, Modeling and Experimental Characterization of Oil/Gas Drill Pipe Failure  
Technical Presentation. IMECE2018-88815

**Jamil Abdo**, *Frostburg State University, Frostburg, MD, United States*, **Edris Hassan**, *Sultan Qaboos University, Muscat, Oman*, **Jan Kwak**, *Qatar University, Doha, Select State/Province, Qatar*

## 5-10 GENERAL TOPICS ON RISK, SAFETY AND RELIABILITY

### 5-10-2 Topics on Risk and Hazard Analysis

Third Floor, David L. Lawrence Convention Center,  
Room 305 1:45pm - 3:30pm

Session Chair: **John Wiechel**, *SEA, Limited, Columbus, OH, United States*

Session Co-Chair: **Javad Sattarvand**, *University of Nevada, Reno, NV, United States*

**1:45pm** Escalator Risk and Assessment of Safety Review  
Technical Paper Publication. IMECE2018-87889

**Thomas Bress**, *Exponent, Bowie, MD, United States*, **Eugenia Kennedy**, *Exponent, Natick, MA, United States*, **Rob Kupkovits**, *Exponent, Atlanta, GA, United States*

**2:00pm** Equipment Fault Diagnosis Based on Image Recognition from Sensor Network Using Deep Learning  
Technical Presentation. IMECE2018-89156

**Tingting Wei**, *Shanghai Jiao Tong University, Shanghai, China*, **MA Shixi**, *Shanghai Jiaotong University, Shanghai, China*, **Dengji Zhou**, *Shanghai Jiao Tong Univ, Shanghai, China*

**2:15pm** Flexible Parametric Proportional Hazard Model for Performance Assessment in Complex Systems; Case Study of Mining Equipment  
Technical Presentation. IMECE2018-89315

**Amir Mohammadi**, *Sahand University of Technology, Tabriz, East Azarbaijan, Iran*, **Mohammad Pourgol-Mohammad**, *JCI/Sahand University of Technology, York, PA, United States*, **amid Agha Babaei**, *Sahand University of Technology, Tabriz, East Azarbaijan, Iran*, **Javad Sattarvand**, *University of Nevada, Reno, NV, United States*

**2:30pm** STUDY ON THE STRUCTURAL STABILITY EVALUATION OF TELESCOPIC BOOM CRANE FOR ROV LARS  
Technical Presentation. IMECE2018-89076

**Namsub Woo**, *KIGAM(Korea Institute of Geoscience and Mineral Resources), Pohang-si, Gyeongsangbuk-do, Korea (Republic)*, **Young Ju Kim**, *Korea Institute of Geoscience and Mineral Resource, Pohang-Si, Gyeongsangbuk-Do, Korea (Republic)*, **Hyunji Kim**, *KIGAM(Korea Institute of Geoscience and Mineral Resources), Pohang-si, Gyeongsangbuk-do, Korea (Republic)*, **Sangmok Han**, *Korea Institute of Geoscience and Mineral Resources, Pohang, Korea (Republic)*, **Jiho Ha**, *KIGAM(Korea Institute of Geoscience and Mineral Resources), Pohang-si, Gyeongsangbuk-do, Korea (Republic)*, **Sunchul Huh**, *Gyeongsang National University, Tongyeong-si, Gyeongsangnam-do, Korea (Republic)*

**2:45pm** Numerical Analysis of Propagation Characteristics of Hazard and Noxious Substance (HNS) Based on the Kriging Model  
Technical Presentation. IMECE2018-88830

**Seong Hyuk Lee**, *Chung-Ang Univ, Seoul, Korea (Republic)*, **C.H. Jeong**, **Min Kyu Ko**, *Chung-Ang University, Seoul, Korea (Republic)*, **Moonjin Lee**, *KRISO, Daejeon, Korea (Republic)*, **Joo Hyun Moon**, *Chung-Ang University, Seoul, Korea (Republic)*

**3:00pm Remaining Useful Life (RUL) Prediction of Rolling Element Bearing Using Random Forest and Gradient Boosting Technique**

**Technical Paper Publication.** IMECE2018-87623

**Sangram Patil**, Veermata Jijabai Technological Institute, Mumbai, Maharashtra, India, **Aum Patil**, Vishwadeep Handikherkar, Veermata Jijabai Technological Institute, Mumbai, Maharashtra, India, **Sumit Desai**, Veermata Jijabai Technological Institute, Mumbai, Maharashtra, India, **Vikas Phalle**, **Faruk Kazi**, Veermata Jijabai Technological Institute, Mumbai, Maharashtra, India

## 5-18 GENERAL

### 5-18-1 General

**Third Floor, David L. Lawrence Convention Center, Room 302 3:45pm - 5:30pm**

Session Chair: **Mohammad Pourgol-Mohammad**, JCI/ Sahand University of Technology, York, PA, United States

**3:45pm How much is too much for a seatback recline to promote occupant submarining: A study using rigid seat sled model and 5TH percentile female ATD**

**Technical Paper Publication.** IMECE2018-86258

**Chandra Thorbole**, TST LLC, Rogers, AR, United States

**4:06pm How much is too much for a seatback recline to promote occupant submarining: A study using rigid seat sled model and 5TH percentile female ATD**

**Technical Paper Publication.** IMECE2018-86259

**Chandra Thorbole**, TST LLC, Rogers, AR, United States

**4:27pm Extension Injuries During Motor Vehicle Collisions in Thoracic Spines With Pre-Existing Pathology**

**Technical Paper Publication.** IMECE2018-86701

**Mathieu Davis**, **Jessica Isaacs**, Exponent, Philadelphia, PA, United States, **Sridhar Natarajan**, Exponent, Phoenix, AZ, United States, **Amy Mumbower**, UT Health San Antonio, San Antonio, TX, United States, **Jacob Fisher**, Exponent, Philadelphia, PA, United States

**4:48pm Assessing Occupant Motion & Seat Back Performance of Contemporary Seats in Rear Impact Collisions**

**Technical Paper Publication.** IMECE2018-87997

**Steven Meyer**, **Arin Nelson**, Safe LLC, Goleta, CA, United States, **Jeremy McMillin**, Safety Analysis & Forensic Engineering, Goleta, CA, United States, **Brian Herbst**, SAFE Laboratories LLC, Goleta, CA, United States

**5:09pm Comparison Study On Reliability Index Approach , Performance Measure Approach And Monte Carlo Simulation Method for pipeline Reliability Evaluation**

**Technical Presentation.** IMECE2018-87326

**Shabbir Memon**, Wichita State University, Wichita, KS, United States, **Obaidur rahman Mohammed**, **Hamid Lankarani**, Wichita State University, Wichita, KS, United States

### 5-18-2 General

**Third Floor, David L. Lawrence Convention Center, Room 303 3:45pm - 5:30pm**

Session Chair: **Mohammad Pourgol-Mohammad**, JCI/ Sahand

University of Technology, York, PA, United States

**3:45pm A Decision-Based Mobility Model and Value of Information for Autonomous Ground Vehicles**

**Technical Presentation.** IMECE2018-89630

**Sam Kassoumeh**, Oakland University, Rochester, MI, United States, **Line Deschenes**, Oakland University Michigan, Rochester Hills, MI, United States, **Vijitashwa Pandey**, Oakland University, Rochester, MI, United States, **David Gorsich**, US ARMY RDECOM - TARDEC, Warren, MI, United States

**4:06pm Design of Smart Electromagnetic Clutch and Development of Control Algorithm for Implementation in a 4-wheeler**

**Technical Presentation.** IMECE2018-88759

**Vedanth Reddy**, National institute of technology Suratkal-Karnataka, Suratkal, karnataka, India

**4:27pm Calculation of neck loads in minor impact**

**Technical Paper Publication.** IMECE2018-88655

**John Wiechel**, SEA, Limited, Columbus, OH, United States

**4:48pm Mitigating Vehicle Incompatibility in Rear Impacts**

**Technical Paper Publication.** IMECE2018-88268

**Christopher Clarke**, SAFE, Santa Barbara, CA, United States, **Steven Meyer**, Safe LLC, Goleta, CA, United States, **Brian Herbst**, SAFE Laboratories LLC, Goleta, CA, United States, **Lauren Bell**, SAFE, Santa Barbara, CA, United States

**5:09pm Analysis of Deformation Induced Vehicle Door Latch Actuation**

**Technical Paper Publication.** IMECE2018-88205

**Christopher Clarke**, SAFE, Santa Barbara, CA, United States, **Steven Meyer**, Safe LLC, Goleta, CA, United States, **Brian Herbst**, SAFE Laboratories LLC, Goleta, CA, United States, **Lauren Bell**, SAFE, Santa Barbara, CA, United States

## **Dynamics, Vibration, and Control MONDAY, NOVEMBER, 12**

### **6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES**

#### **6-4-1 Robot Control I**

**Third Floor, David L. Lawrence Convention Center, Room 307 9:45am - 11:30am**

Session Chair: **Ho-Hoon Lee**, Southeastern LA University, Hammond, LA, United States

Session Co-Chair: **Yong Zhu**, Wilkes University, Wilkes Barre, PA, United States

**9:45am Control of a Robotic Prosthetic Hand Using an EMG Signal Based Counter**

**Technical Paper Publication.** IMECE2018-86032

**Kyle Stanek**, **Nathan Barnhart**, Wilkes University, Wilkes-Barre, PA, United States, **Yong Zhu**, Wilkes University, Wilkes Barre, PA, United States

**10:06am**                    **Dynamic Modeling and Control of the Hexapod Robot Using Matlab SimMechanics**  
Technical Paper Publication. IMECE2018-88226  
*Sameh I. Beaver, Military Technical College, Cairo, Cairo, Egypt, Abdelrahman Zaghloul, McMaster University, Hamilton, ON, Canada, Mohamed kamel, Wessam Hussein, Military Technical College, Cairo, Egypt*

**10:27am**                    **Simultaneously Satisfying Multi-Objective Design of Structural and Control Systems Based on Consideration of Uncertainty by Set-Based Approach**  
Technical Paper Publication. IMECE2018-86757  
*Haruo Ishikawa, University of Electro-communications, Chofu, Tokyo, Japan, Naoko Sasaki, The Electro-Communications, Chofu, Japan*

**10:48am**                    **Control for a Two-Link Planar Robot With an Actuated Tail**  
Technical Paper Publication. IMECE2018-86827  
*Xinjia Yu, Carnegie Mellon University, Pittsburgh, PA, United States, Mark Bedillion, Carnegie Mellon University, Gibsonia, PA, United States*

**11:09am**                    **A Path-Generating Motion Control Scheme for a Mobile Robot in the Environment of Obstacles**  
Technical Paper Publication. IMECE2018-86524  
*Ho-Hoon Lee, Southeastern LA University, Hammond, LA, United States*

## **6-4-7 Compliant Mechanisms**

**Third Floor, David L. Lawrence Convention Center, Room 308    9:45am - 11:30am**

Session Chair: **Hong Zhou, Texas A&M University-Kingsville, Kingsville, TX, United States**

Session Co-Chair: **Ayse Tekes, Kennesaw State University, Marietta, GA, United States**

**9:45am**                    **Compliant Translational Double Exact Dwell Mechanism**  
Technical Paper Publication. IMECE2018-86073  
*Ayse Tekes, Hongkuan Lin, Kennesaw State University, Marietta, GA, United States*

**10:06am**                    **On Novel Dynamic Displacement Amplification Using Compliant Mechanisms**  
Technical Paper Publication. IMECE2018-87638  
*Abhijit Tanksale, Prasanna Gandhi, Indian Institute of Technology, Bombay., Mumbai, Maharashtra, India*

**10:27am**                    **Reduction of Jerk Through Optimization of a Knee Assistive Device Designed Using Four-Bar Controlled Compliance Actuator**  
Technical Paper Publication. IMECE2018-87012  
*Saikat Sahoo, Aditya Jain, Dilip Pratihar, Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

**10:48am**                    **Large Deformation Analysis and Experiments With Double Parallelogram Compliant Mechanisms**  
Technical Paper Publication. IMECE2018-87604  
*Abhijit Tanksale, Prasanna Gandhi, Indian Institute of Technology, Bombay., Mumbai, Maharashtra, India*

**11:09am**                    **Synthesizing Bidirectional Constant Torque Compliant Mechanisms Using Precompressed Beams**  
Technical Paper Publication. IMECE2018-86469  
*Monik Thanaki, Texas A&M University-Kingville, Kingville, TX, United States, Hong Zhou, Texas A&M University-Kingsville, Kingsville, TX, United States*

## **6-12 MOBILE SERVICE ROBOTS AND UNMANNED VEHICLES**

### **6-12-1 Mobile Service Robots and Unmanned Vehicles I**

**Third Floor, David L. Lawrence Convention Center, Room 315    9:45am - 11:30am**

Session Chair: **Giuseppe Quaglia, Politecnico Di Torino - DIMEAS, Torino, OO, Italy**

**9:45am**                    **Rese\_Q: UGV for Rescue Tasks Functional Design**  
Technical Paper Publication. IMECE2018-86395  
*Giuseppe Quaglia, Politecnico Di Torino - DIMEAS, Torino, OO, Italy, Paride Cavallone, Politecnico di Torino, Torino, Italy*

**10:06am**                    **Image Identification of a Moving Object Based on an Improved Canny Edge Detection Algorithm**  
Technical Paper Publication. IMECE2018-86792  
*Yang Liu, Lingyu Sun, Lijun Li, Yiben Zhang, Beihang University, Beijing, China, Zongmiao Dai, Zhenkai Xiong, Zhengzhou Electromechanical Engineering Research Institute, Zhengzhou, China*

**10:27am**                    **A Optimized Formation Control of Autonomous Underwater Vehicles**  
Technical Paper Publication. IMECE2018-87299  
*Mansour Karkoub, Texas A&M University, College Station, TX, United States, Lotfi ROMDHANE, AMERICAN UNIVERSITY OF SHARJAH., Sharjah, United Arab Emir.*

**10:48am**                    **Performance Analysis of UAV Visual Landmark Tracking Under Rapid Motion**  
Technical Paper Publication. IMECE2018-88345  
*Eric Jacobson, Akin Tatoglu, University of Hartford, West Hartford, CT, United States*

**11:09am**                    **On Self-Driving Car Safety: Occupancy Map Modification With Rapid Emergency Vehicle Detection**  
Technical Paper Publication. IMECE2018-88492  
*Akin Tatoglu, Eoin King, Jarrett Lagler, University of Hartford, West Hartford, CT, United States*

## **6-13 CONTROL THEORY AND APPLICATIONS**

### **6-13-1 Control Theory and Applications I**

**Third Floor, David L. Lawrence Convention Center, Room 309    9:45am - 11:30am**

Session Chair: **Jacob A. Farber, University Of Pittsburgh, Pittsburgh, PA, United States**

**9:45am** Improving Boiler Efficiency Using PLC Controller

Technical Paper Publication. IMECE2018-86100

**Hung Tang**, TAI Engineering, York, PA, United States, **Ma'moun Abu-Ayyad**, Penn State Harrisburg, Middletown, PA, United States

**10:00am** Dynamic Exposure Model of Scanning Beam Interference Lithography

Technical Paper Publication. IMECE2018-86979

**Sen Lu**, **Kaiming Yang**, **Yu ZHU**, **Leijie Wang**, **Ming Zhang**, Tsinghua University, Beijing, China

**10:15am** Using Multiple-Model Adaptive Estimation and System Identification for Fault Detection in Nuclear Power Plants

Technical Paper Publication. IMECE2018-87616

**Jacob A. Farber**, **Daniel G. Cole**, University of Pittsburgh, Pittsburgh, PA, United States

**10:30am** Intelligent Adaptive Control for Anti-Lock Braking System

Technical Paper Publication. IMECE2018-87659

**Wafa Batayneh**, Jordan University of Science and Technology, Irbid, OO, Jordan, **Mohammad Jaradat**, American University of Sharjah, Sharjah, OO, United Arab Emir., **Ahmad Bataineh**, Jordan University of Science and Technology, Irbid, OO, Jordan

**10:45am** A Game-Theoretic Approach to Defending Nuclear Instrumentation and Control Systems From Cyber-Threats

Technical Paper Publication. IMECE2018-87713

**Lee T. Maccarone**, **Daniel G. Cole**, University of Pittsburgh, Pittsburgh, PA, United States

**11:00am** Application of the Levenberg-Marquardt Algorithm to Control a Gough-Stewart Platform

Technical Presentation. IMECE2018-89399

**David Gordon**, Calif. State Polytechnic Univ. at Pomona, Pomona, CA, United States, **Kevin Anderson**, California State Polytech Univ, Pomona, CA, United States, **Nolan Tsuchiya**, California State Polytechnic University, Pomona, Pomona, CA, United States

## **6-15 MEASUREMENT AND ANALYSIS TECHNIQUES IN NONLINEAR DYNAMIC**

**6-15-1 Measurement and Analysis Techniques in Nonlinear Dynamics I**

**Room 311** **9:45am - 11:30am**

Session Chair: **Pezhman Hassanpour**, Loyola Marymount University, Los Angeles, CA, United States

**9:45am** Effect of Eccentricity on the Nonlinear Dynamic Behavior of a Cam and Follower Mechanism With Clearance

Technical Paper Publication. IMECE2018-86202

**Louay S. Yousuf**, Auburn University, WALLED LAKE, MI, United States, **Dan Marghitu**, Auburn University, AUBURN, AL, United States

**10:06am** Numerical Modeling and Analysis of Nonlinear Dynamic Response for a Bolted Joint Beam Considering Interface Frictional Contact

Technical Paper Publication. IMECE2018-86743

**Dongwu Li**, Northwestern Polytechnical University, Xi'an, Shaanxi, China, **Chao xu**, Northwestern Polytechnical University, Xi'an, Shaanxi, China, **Dong Wang**, China Academy of Engineering Physics, miyang, China, **Lihua Wen**, Northwestern Polytechnical University, XI'AN, Shaanxi, China

**10:27am** An Improved Analytical Model of Friction and Ball Motion in Linear Ball Bearings: With Application to Ball-To-Ball Contact Prediction

Technical Paper Publication. IMECE2018-88033

**Bo Lin**, **Molong Duan**, The University of Michigan, Ann Arbor, MI, United States, **Chinedum Okwudire**, University of Michigan, Ann Arbor, MI, United States, **Jason Wou**, Ford Motor Company, Dearborn, MI, United States

**10:48am** Dynamic Characteristics of Resonant Beams With Passive Thermal Stress Regulators

Technical Paper Publication. IMECE2018-88536

**Tyler Kellar**, **Pezhman Hassanpour**, Loyola Marymount University, Los Angeles, CA, United States

**11:09am** Approximate Response of Beam-Type Resonant Biosensors

Technical Paper Publication. IMECE2018-88535

**Pezhman Hassanpour**, Loyola Marymount University, Los Angeles, CA, United States

## **6-17 MULTI-PHYSICS DYNAMICS-CONTROL & DIAGNOSTICS-PROGNOSTICS OF STRUCTURES AND**

**6-17-1 Multi-Physics Dynamics-Control & Diagnostics-Prognostics of Structures I**

**Room 310** **9:45am - 11:30am**

Session Chair: **Nikolaos Xiros**, University of New Orleans, NAVAL ARCH & MARINE ENG, New Orleans, LA, United States

**9:45am** Toward a Contactless Hydrokinetic Energy Harvester: A Computational Magnetic Field Estimation

Technical Paper Publication. IMECE2018-87063

**Georgios Tsakyridis**, University of New Orleans, New Orleans, LA, United States, **Nikolaos Xiros**, University of New Orleans, NAVAL ARCH & MARINE ENG, New Orleans, LA, United States, **Michael Bernitsas**, Univ Of Michigan, Ann Arbor, MI, United States

**10:06am** Research on a Mechanical Model of the Connecting and Sliding Parts in Motion for a Reciprocating Compressor

Technical Paper Publication. IMECE2018-87392

**Yu Mizobe**, Yamaguchi University, Ube City / Yamaguchi, Japan, **Takashi Saito**, Yamaguchi University, Ube / Yamaguchi, Japan, **Yoshifumi Mori**, Tokuyama Corporation, Yamaguchi, Japan

**10:27am** Study on Dependency of Dynamic Properties in a Rolling Roller on Fine Coal Upon the Running Velocity

Technical Paper Publication. IMECE2018-87416

*Kentaro OSHIRO*, Yamaguchi University, Ube/Yamaguchi, Japan, *Akira Kobayashi*, *Kazuhiro Watanabe*, *Emi Ohno*, *Makoto Echizenya*, IHI Corporation, Koto-ku, Japan, *Katsuhide Fujita*, National Institute of Technology, Ube College, Ube, Japan, *Takashi Saito*, Yamaguchi University, Ube / Yamaguchi, Japan

**10:48am** Shape Memory Alloy Based Rotational Actuator

Technical Paper Publication. IMECE2018-87646

*Nicholas Hofmann*, University of St. Thomas, St. Paul, MN, United States, *Michael Hennessey*, Univ Of St Thomas, Saint Paul, MN, United States

**11:09am** System Identification for Control of a Bow Thruster With Brushless Motor and Shaft-Less Propeller

Technical Paper Publication. IMECE2018-88029

*Priyatham Sanjeeva Reddy Ramidi*, University of New Orleans, New Orleans, LA, United States, *Nikolaos Xiros*, University of New Orleans, NAVAL ARCH & MARINE ENG, New Orleans, LA, United States, *Stavros Lalizas*, *Anastasios Papavasileiou*, *Vasileios Douvris*, *Nikolas Theodorou*, *Alexandros Lalizas*, LALIZAS Hellas, Piraeus, Piraeus, Greece

## 6-2 GENERAL

### 6-2-1 Dynamics, Vibration, and Control-I

Third Floor, David L. Lawrence Convention Center  
Room 308 1:45pm - 3:30pm

Session Chair: **Christopher Jobes**, NIOSH, Pittsburgh, PA, United States

Session Co-Chair: **Ashkan Eslaminejad**, North Dakota State University, Fargo, ND, United States

**1:45pm** Identification of Lug Excitation Force by Using Three-dimensional Rigid Ring Model

Technical Presentation. IMECE2018-86339

*Katsuhide Fujita*, National Institute of Technology, Ube College, Ube, Japan, *Takashi Saito*, Yamaguchi University, Ube / Yamaguchi, Japan, *Mitsugu Kaneko*, Yanmar Co., Ltd., Maibara, Japan

**2:06pm** Development of Vehicle Seat by Embedding Urethane Within Air Cell

Technical Paper Publication. IMECE2018-86389

*Shinichiro Ota*, Okayama prefectural University, Souja, Okayama, Japan, *Yuji Nakamura*, Okayama prefectural Univ, Okayama, Japan

**2:27pm** Dynamic Modeling System to Determine Stopping Distances of Mobile Underground Coal Equipment

Technical Paper Publication. IMECE2018-86422

*Christopher Jobes*, *Jacob Carr*, NIOSH, Pittsburgh, PA, United States

**2:48pm** A Comparative Study of Rapid Quadrupedal Sprinting and Turning Dynamics on Different Terrains and Conditions: Racing Greyhounds Galloping Dynamics

Technical Paper Publication. IMECE2018-87144

*Hasti Hayati*, UTS, Sydney, NSW, Australia, *Paul Walker*, University of Technology, Sydney (UTS), Ultimo, NSW, Australia, *Fatemeh Mahdavi*, University of Technology Sydney (UTS), Ultimo, NSW, Australia, *Robert Stephenson*, University of Technology, Sydney (UTS), Sydney, NSW, Australia, *Terry Brown*, University of Technology Sydney (UTS), Ultimo, NSW, Australia, *David Eager*, University of Technology Sydney, Sydney, NSW, Australia

**3:09pm** Numerical Research on Machining Stability Subject to Delayed PID Control

Technical Paper Publication. IMECE2018-87475

*Mingjie Li*, Huazhong University of Science and Technology, Wuhan, Hubei, China, *Xiaoqian Zhang*, *Yakun Xie*, Huazhong University of Science and Technology, Wuhan City, China

## 6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES

### 6-4-2 Robot Control II

Third Floor, David L. Lawrence Convention Center,  
Room 307 1:45pm - 3:30pm

Session Chair: **Yoram Halevi**, Tech-israel Institute Of Tech, Technion City Haifa 32000, Israel

Session Co-Chair: **Wooram Park**, University of Texas at Dallas, Richardson, TX, United States

**1:45pm** Brain-Computer Interface Application in Robotic Gripper Control

Technical Paper Publication. IMECE2018-86274

*Briana Landavazo*, California State University Northridge, Northridge, CA, United States, *Vidya Nandikolla*, California State University, Northridge, CA, United States

**2:06pm** Minimum Energy Control of Redundant Systems Using Evolutionary Bi-Level Optimization

Technical Paper Publication. IMECE2018-88709

*Uriel Nusbaum*, Technion, Haifa, Israel, *Miri Weiss Cohen*, Braude College of Engineering, Karmiel, OO, Israel, *Yoram Halevi*, Tech-israel Institute Of Tech, Technion City Haifa 32000, Israel

**2:27pm** Light-powered Soft Robots

Technical Presentation. IMECE2018-89146

*Shengqiang Cai*, UC San Diego, La Jolla, CA, United States

**2:48pm** Dynamic Analysis for Motor-Powered Periotomes in Dentistry

Technical Paper Publication. IMECE2018-88196

*JIANPING LIN*, *Om A. Sharma*, *Wooram Park*, University of Texas at Dallas, Richardson, TX, United States

**3:09pm** Functional Design of a Robust Dynamic Position and Data Acquisition System

Technical Paper Publication. IMECE2018-87993

*James Meyers*, U. S. Coast Guard, Quincy, MA, United States, *Tooran Emami*, U. S. Coast Guard Academy, East Lyme, CT, United States

## **6-8 SMART STRUCTURES AND STRUCTRONIC SYSTEMS: SENSING, ENERGY GENERATION AND CONTROL**

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### **6-8-1 Mechanics of Smart structures**

**Third Floor, David L. Lawrence Convention Center, Room 309 1:45pm - 3:30pm**

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Session Chair: **Hornsen(HS) TZOU**, *Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China*

**1:45pm Development of Soft Body Rescue-Bot Using 3D Printing**

**Technical Paper Publication.** IMECE2018-86860

*Cody Lewis, Jared Legg, Minchul Shin, Georgia Southern University, statesboro, GA, United States*

**2:00pm INDUCTANCE OF TWISTED NYLON ACTUATORS WITH CONDUCTIVE WIRES**

**Technical Presentation.** IMECE2018-87214

*Hua Li, Haochen Ye, K.M. Hu, Zhejiang University, Hangzhou, China*

**2:15pm Structural Self-Sensing by Capacitance Measurement**

**Technical Presentation.** IMECE2018-87748

*Deborah D.L. Chung, Univ At Buffalo, State Univ of NY, Buffalo, NY, United States, Kairong Shi, Yulin Wang, Asma A. Eddib, University at Buffalo, The State University of New York, Buffalo, NY, United States*

**2:30pm Study on Large Deformation of Laminated Piezoelectric Rectangular Plate**

**Technical Paper Publication.** IMECE2018-88599

*Lihua Chen, Shoujie Cui, Beijing University of Technology, Beijing, China, Xiaozhi Zhang, University of Vermont, Burlington, VT, United States, Wei Zhang, Beijing University of Technology, Beijing, China*

**2:45pm Frequency Control of Simply Supported Beam By Light-Activated Shape Memory Polymers**

**Technical Presentation.** IMECE2018-88814

*Yang Yunze, Yuan Jihai, Fan Mu, Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China*

**3:00pm Mesh-Free Vibration Analysis of Suspended Strain Gradient Nano-Plate**

**Technical Paper Publication.** IMECE2018-87428

*Wang LI, Lifeng Wang, Jingnong Jiang, Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China*

## **6-9 NOVEL CONTROL OF DYNAMIC SYSTEM AND**

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### **6-9-1 Novel Control of Dynamic System I**

**Room 310 1:45pm - 3:30pm**

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Session Chair: **C. Steve Suh**, *Texas A&M University, College Station, TX, United States*

**1:45pm A Novel Nonlinear Time-Frequency Strategy for Stabilizing Inverted Pendulum Cart System**

**Technical Paper Publication.** IMECE2018-86758

*Zilong Zhang, C. Steve Suh, Texas A&M University, college station, TX, United States*

**2:06pm An Experimental Study of Periodic Motions in a Duffing Oscillator**

**Technical Paper Publication.** IMECE2018-86833

*Yu Guo, Midwestern State University, Wichita Falls, TX, United States, Albert Luo, Southern Illinois Univ, Edwardsville, IL, United States, Abigail Reyes, Zeltzin Reyes, Midwestern State University, Wichita Falls, TX, United States*

**2:27pm "Period Motions in a Periodically Forced, Damped Double Pendulum"**

**Technical Paper Publication.** IMECE2018-86849

*Chuan Guo, Southern Illinois University Edwardsville, Edwardsville, IL, United States, Albert Luo, Southern Illinois Univ, Edwardsville, IL, United States*

**2:48pm On the Proper Description of Complex Network Dynamics**

**Technical Paper Publication.** IMECE2018-88051

*Chun-Lin Yang, Texa A&M University, COLLEGE STATION, TX, United States, C. Steve Suh, Texas A&M University, College Station, TX, United States*

**3:09pm An Optimization Model of High-Speed and High-Precision Machining Based on Model Predictive Control**

**Technical Paper Publication.** IMECE2018-88326

*Jing Zhang, Jiexiong Ding, University of Electronic Science and Technology of China, Chengdu, Select State/Province, China, Qinghao Li, University of Electronic Science and Technology of China, Chengdu, China, Qicheng Ding, Zhong Jiang, Li Du, University of electronic science and technology of China, Chengdu, China, Wei Wang, University Electronic Science Technology of china, Chengdu, China*

## **6-12 MOBILE SERVICE ROBOTS AND UNMANNED VEHICLES**

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### **6-12-2 Mobile Service Robots and Unmanned Vehicles II**

**Third Floor, David L. Lawrence Convention Center, Room 315 1:45pm - 3:30pm**

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Session Chair: **Giuseppe Quaglia**, *Politecnico Di Torino - DI-MEAS, Torino, OO, Italy*

**1:45pm Iterative Modeling of a Small Underwater Tethered Remotely Operated Vehicle**

**Technical Paper Publication.** IMECE2018-88501

*Andrés F. Aldana, Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia, Helio Sneyder Esteban Villegas, Universidad Autónoma de Bucaramanga, Bucaramanga, Select State/Province, Colombia, Sebastian Roa Prada, Universidad Autónoma de Bucaramanga, Bucaramanga, Santander, Colombia*

**2:06pm** Design of a Robust Yaw Rate Controller Using Sliding Mode Control and Extended State Observer for Navigation of an Autonomous Ground Vehicle

Technical Paper Publication. IMECE2018-88752

*Suraj Borate*, Defence Institute of Advanced Technology, Pune, India, *Shubhashisa Sahoo*, Center for Artificial Intelligence and Robotics, Bangalore, India, *Devika K.B.*, *Shankar Coimbatore Subramanian*, Indian Institute of Technology, Madras, Chennai, India, *K.K Mangrulkar*, Defence Institute of Advanced Technology, Pune, India

**2:27pm** Low-Light Pedestrian Recognition System

Technical Presentation. IMECE2018-88835

*Fei Lin*, *John E. Ball*, Mississippi state university, Starkville, MS, United States

**2:48pm** Advances in Multirobot Adaptive Navigation of Environmental Scalar Fields

Technical Presentation. IMECE2018-88910

*Christopher Kitts*, Santa Clara University, Santa Clara, CA, United States

## **6-19 RENEWABLE ENERGY, STRUCTURAL HEALTH MONITORING, AND DISTRIBUTED STRUCTURAL SYSTEMS**

**6-19-1 Renewable Energy, Structural Health Monitoring, and Distributed Structural Systems I**

**Room 311 1:45pm - 3:30pm**

Session Chair: *Weidong Zhu*, University of Maryland, Baltimore County, Baltimore, MD, United States

**1:45pm** Effectiveness of Using Mixed Coordinates in Modeling Wind Turbines

Technical Paper Publication. IMECE2018-87493

*Ayman A. Nada*, *Ali S. Al-Shahrani*, Jazan University, Jazan, OO, Saudi Arabia

**2:06pm** Effect of Damage on the Normalized Frequency of Beam-Like Structures Using Vibration Based Technique.

Technical Presentation. IMECE2018-88788

*PUTTI SRINIVASA RAO*, ANDHRA UNIVERSITY, VISAKHAPATNAM, ANDHRA PRADESH, India, *SIVA SANKARA BABU CHINKA*, Lakireddy Balireddy college of Engineering, Mylavaram, India, *BALAKRISHNA ADAVI*, SRKR college of Engineering, Bhimavaram, India

**2:27pm** Damage Recognition In Plate-Form Structures Using Changes In Modal Strain Energy

Technical Presentation. IMECE2018-88798

*PUTTI SRINIVASA RAO*, ANDHRA UNIVERSITY, VISAKHAPATNAM, ANDHRA PRADESH, India, *Ramesh Lanka*, Gudlavalleru Engineering College, Gudlavalleru, India

**2:48pm** Proof Mass Study for Low Frequency Vibration Energy Harvesting of Piezoelectric Cantilever

Technical Paper Publication. IMECE2018-88163

*Iu wang*, *xi?an jiaotong university*, *xi?an*, *shaanxi*, China, *libo zhao*, *Dejiang Lu*, *Chen Jia*, *Zhuangde Jiang*, *Xi?an Jiaotong University*, *xi?an*, *shaanxi*, China

**3:09pm** Absolute Vibration Suppression (AVS) Control For Fractional Order Systems

Technical Presentation. IMECE2018-88710

*Yoram Halevi*, Tech-israel Institute Of Tech, Technion City Haifa 32000, Israel

## **6-2 GENERAL**

**6-2-2 Dynamics, Vibration, and Control-II**

**Third Floor, David L. Lawrence Convention Center, Room 308 3:45pm - 5:30pm**

Session Chair: *Sohel Anwar*, Indiana University-Purdue University Indianapolis, Carmel, IN, United States

**3:45pm** Sommerfeld Effect and Passive Energy Reallocation in a Self-Synchronizing System

Technical Paper Publication. IMECE2018-87559

*Anubhab Sinha*, *Saurabh Kumar Bharti*, *Arun Kumar Samantaray*, *Ranjan Bhattacharyya*, Indian Institute Of Technology Kharagpur, KHARAGPUR, India

**4:06pm** Finite Element Analysis (FEA) for Optimization the Design of a Baja SAE Chassis

Technical Paper Publication. IMECE2018-87564

*Jessica Gissella Maradey Lazaro*, Universidad Aut3Noma De Bucaramanga, Bucaramanga, Colombia, *Helio Sneyder Esteban Villegas*, *Braulio Jos3 Blanco Caballero*, Universidad Aut3n3ma de Bucaramanga, Bucaramanga, Select State/Province, Colombia

**4:27pm** A Virtual Sensor for Soot Load Estimation in Diesel Particulate Filters

Technical Paper Publication. IMECE2018-88094

*Pratik V. Magar*, *Afshin Izadian*, Indiana University Purdue University Indianapolis, Indianapolis, IN, United States, *Sohel Anwar*, Indiana University-Purdue University Indianapolis, Carmel, IN, United States

**4:48pm** Analysis of Magneto Electro Elastic Circular Plates Based on DQ Method

Technical Presentation. IMECE2018-88782

*Saeed Amir*, University of Kashan, Kashan, Isfahan, Iran, *Abbasn Loghman*, *Ehsan Arshid*, Kashan university, Kashan, Iran, *Ali Haghshenas*, Louisiana State University, Louisiana State, LA, United States

**5:09pm** An Efficient Layerwise Theory Based Facet Shell Element for Modeling of Composite and Sandwich Shells With Multiple Delaminations Using a Hybrid Continuity Method

Technical Presentation. IMECE2018-89558

*Adnan Ahmed*, Indian Institute of Technology Delhi, New Delhi, India, *Santosh Kapuria*, IIT Delhi, New Delhi, India

## 6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES

### 6-4-3 Robot Design I

Third Floor, David L. Lawrence Convention Center,  
Room 307 3:45pm - 5:30pm

Session Chair: **Vivek Sangwan**, *Indian Institute of Technology Bombay, Mumbai, India*

Session Co-Chair: **Kiwon Sohn**, *University of Hartford, West Hartford, CT, United States*

**3:45pm** "Development of Lower Body for Vehicle Driving Robot, HART"

Technical Paper Publication. IMECE2018-86470

**Kiwon Sohn, Mark Markiewicz, Stefan Keilich**, *University of Hartford, West Hartford, CT, United States*

**4:06pm** An Accurate On-Line Correction Strategy for Gravity Compensation Aiming at Teaching by Touch of Collaborative Robots

Technical Paper Publication. IMECE2018-86649

**Yunfei Dong, Tianyu Ren, Dan Wu**, *Tsinghua University, Beijing, Beijing, China*, **Ken Chen**, *Tsinghua University, Beijing, Beijing, China*

**4:27pm** Optimal Mechatronic Design of a Quadruped Robot With Compliant Legs

Technical Paper Publication. IMECE2018-88055

**Jaime Arcos-Legarda, Khamesra Hisham**, *Indiana University Purdue University Indianapolis, Indianapolis, IN, United States*

**Sohel Anwar**, *Indiana University Purdue University Indianapolis, Carmel, IN, United States*, **Andres Tovar**, *Indiana University-Purdue University Indianapolis, Indianapolis, IN, United States*

**4:48pm** Paper-based Robotic Systems with Stackable Inflatable Actuators

Technical Presentation. IMECE2018-89611

**Xiyue Zou, Michael Yang, Cora LoPresti**, *Rutgers University, Piscataway, NJ, United States*, **Smit Shukla**, *Birla Institute of Technology, Mesra, India*, **Tongfen Liang**, *Rutgers University, Piscataway, NJ, United States*, **Meriem Akin**, *Braunschweig University of Technology, Braunschweig, Germany*, **Aaron Mazzeo**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

**5:09pm** Study of Symmetric Solutions of an Underactuated Bipedal Robot

Technical Paper Publication. IMECE2018-87723

**Prachi Shah, Vivek Sangwan**, *Indian Institute of Technology Bombay, Mumbai, Maharashtra, India*

## 6-8 SMART STRUCTURES AND STRUCTRONIC SYSTEMS: SENSING, ENERGY GENERATION AND CONTROL

### 6-8-2 Energy harvesting and Transducers

Third Floor, David L. Lawrence Convention Center,  
Room 309 3:45pm - 5:30pm

Session Chair: **Hornsen(HS) TZOU**, *Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, China*

**3:45pm** Multi-Stable Magnetic Spring-Based Energy Harvester Subject to Harmonic Excitation: Comparative Study and Experimental Evaluation

Technical Paper Publication. IMECE2018-86157

**Hieu Nguyen, Hamzeh Bardaweel**, *Louisiana Tech University, Ruston, LA, United States*

**4:06pm** Study on Motor-Driven Gyroscopic Generator: Part 1 Characteristics at Constant Velocity

Technical Paper Publication. IMECE2018-86390

**Hiroshi Hosaka, Yoshinori Oonishi, Yuki Tajima**, *The University of Tokyo, Kashiwa-city, Chiba, Japan*, **Akira Yamashita**, *Seigi Kanagata Co., Ltd., Shiroy-city, Chiba prefecture, Japan*

**4:27pm** Study on Motor-Driven Gyroscopic Generator: Part 2 Self-Acceleration by Power Feedback

Technical Paper Publication. IMECE2018-86444

**Yuki Tajima, Yoshinori Oonishi, Hiroshi Hosaka**, *The University of Tokyo, Kashiwa-city, Chiba, Japan*

**4:48pm** Energy Harvesting of Coupled and High Frequency Vibrations of Quartz Crystal Plates

Technical Presentation. IMECE2018-88333

**Qi Huang, Rongxing Wu, Longtao Xie**, *Ningbo University, Ningbo, Zhejiang, China*, **Guoliang Huang**, *University of Missouri, COLUMBIA, MO, United States*, **Jianke Du, Ji Wang**, *Ningbo University, Ningbo, Zhejiang, China*

**5:09pm** Control-based power amplification in thermoacoustic-piezoelectric energy harvesting devices

Technical Presentation. IMECE2018-88125

**Jesse Callanan**, *University at Buffalo (SUNY), Buffalo, NY, United States*, **Mostafa Nouh**, *University at Buffalo, Buffalo, NY, United States*

## 6-9 NOVEL CONTROL OF DYNAMIC SYSTEM AND

### 6-9-2 Novel Control of Dynamic System II

Room 310 3:45pm - 5:30pm

Session Chair: **C. Steve Suh**, *Texas A&M University, College Station, TX, United States*

**3:45pm** "Periodic Motions in a First-Order, Time-Delayed, Nonlinear System"

Technical Paper Publication. IMECE2018-86824

**Siyuan Xing**, *Southern Illinois University Edwardsville, Edwardsville, IL, United States*, **Albert Luo**, *Southern Illinois Univ, Edwardsville, IL, United States*

**4:06pm**      **Periodic Motions in a Van Der Pol Oscillator**  
**Technical Paper Publication.** IMECE2018-86842  
*YEYIN XU, Southern Illinois University Edwardsville, Edwardsville, IL, United States, Albert Luo, Southern Illinois Univ, Edwardsville, IL, United States*

**4:27pm**      **Period Motions and Stability in a Nonlinear Spring Pendulum**  
**Technical Paper Publication.** IMECE2018-86862  
*Albert Luo, Southern Illinois Univ, Edwardsville, IL, United States, Yaoguang Yuan, Southern Illinois University Edwardsville, Edwardsville, IL, United States*

**4:48pm**      **On the Temporal Network Analysis With Link Prediction**  
**Technical Paper Publication.** IMECE2018-88101  
*Bin Wu, C. Steve Suh, Texas A&M University, College Station, TX, United States*

**5:09pm**      **Low Cost Robotic Arm Manipulator Controller With Single Stage Fluid Valves**  
**Technical Paper Publication.** IMECE2018-88435  
*Claudio Campana, Akin Tatoglu, University of Hartford, West Hartford, CT, United States*

## **6-11 VIBRATIONS OF CONTINUOUS SYSTEMS**

### **6-11-2 Vibrations of Continuous Systems II**

**Room 311      3:45pm - 5:30pm**

Session Chair: *Ibrahim F Gebrel, The University of Western Ontario, London, ON, Canada*  
Session Co-Chair: *Aman Kumar, Indian Institute of Technology Kharagpur, Khargapur, India, Mustapha Fofana, Worcester Polytechnic Inst, Worcester, MA, United States*

**3:45pm**      **Dynamic Analysis and Design of a Novel Ring-Based Vibratory Energy Harvester**  
**Technical Paper Publication.** IMECE2018-87164  
*Ibrahim F Gebrel, The University of Western Ontario, London, ON, Canada, Ligang Wang, Harbin Engineering University, Harbin, Heilongjiang, China, Samuel Asokanathan, Univ Of Western Ontario, London, ON, Canada*

**4:06pm**      **Modal Identification and Nonlinear Vibration of Flexible Manipulator With Revolute Pair Incorporating Generic Payload**  
**Technical Paper Publication.** IMECE2018-88527  
*Pravesh Kumar, Barun Pratiher, Indian Institute of Technology Jodhpur, Jodhpur, RAJASTHAN, India*

**4:27pm**      **EVALUATION OF VIBRATION PERFORMANCE OF OVERHEAD LINE CONDUCTOR AND INSULATOR STRING FOR 800 KV HVDC SYSTEM**  
**Technical Presentation.** IMECE2018-86105  
*Gnanavel B K, SAVEETHA ENGINEERING COLLEGE, CHENNAI, TAMILNADU, India, Anantha Babu M D, Vibration Laboratory Mechanical Engineering Division,, Bangalore, Karnataka, India, Raja Rajeswari N, SAVEETHA ENGINEERING COLLEGE,, CHENNAI, TAMILNADU, India, Lakshmanan Singaram, Department of Mechanical Engineering, Chennai, Tamilnadu, India, KAMESH K, MURUGAPPA POLYTECHNIC COLLEGE, CHENNAI, TAMILNADU, INDIA, India*

**4:48pm**      **Generation of Travelling Waves in Beams Using Search Based Optimization.**  
**Technical Presentation.** IMECE2018-88719  
*Aman Kumar, Anirvan Dasgupta, Indian Institute of Technology Kharagpur, Khargapur, India*

**5:09pm**      **Impact vibration analysis of a continuous system colliding with elastic bodies at an arbitrary position**  
**Technical Presentation.** IMECE2018-88742  
*Yuji Suzuki, Tatsuhito AIHARA, Hosei University, Tokyo, Tokyo, Japan*

## **TUESDAY, NOVEMBER, 13**

### **6-1 PLENARY PRESENTATIONS**

#### **6-1-1 Dynamics, Vibration, and Control Plenary**

**Third Floor, David L. Lawrence Convention Center, Room 303      8:00am - 8:45am**

**8:00am**      **Complex Modal Decomposition for Traveling Waves and Nonsynchronous Oscillations**  
**Plenary Presentation.** IMECE2018-90097  
*Brian Feeny, Michigan State Univ, East Lansing, MI, United States*

### **6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES**

#### **6-4-4 Robot Design II**

**Third Floor, David L. Lawrence Convention Center, Room 307      10:00am - 11:45am**

Session Chair: *He Shen, California State University, Los Angeles, Los Angeles, CA, United States*  
Session Co-Chair: *Kiwon Sohn, University of Hartford, West Hartford, CT, United States*

**10:00am**      **Service Robot Design for Uses in Human Centered Environments**  
**Technical Paper Publication.** IMECE2018-86479  
*Kiwon Sohn, Ethan Morris, Obioma Ulebor, Thomas Currier, Shaun Merrill, University of Hartford, West Hartford, CT, United States*

**10:21am**      **Motion Planning for Handspring Maneuver Using a Two Link Robot**  
**Technical Paper Publication.** IMECE2018-87809  
*Raunaq Bhirangi, Vivek Sangwan, Indian Institute of Technology Bombay, Mumbai, Maharashtra, India*

**10:42am**      **Low Cost Optical Mechanical System for Human Robot Interaction**  
**Technical Paper Publication.** IMECE2018-87885  
*Yulai Weng, Andrew Specian, Mark Yim, University of Pennsylvania, Philadelphia, PA, United States*

**11:03am** Enhancing the Path Planning Generation of a Five DOF Manipulator Using Low-Cost Camera-Laser Triangulation Technique

Technical Paper Publication. IMECE2018-88144

**Ahmed Y. AbdelHamid**, Military Technical College, Cairo, Egypt, **Maged M. Abou Elyazed**, Technical Research Center, Cairo, Egypt, **Mohamed H. Mabrouk**, **Mootaz E. Abo Elnor**, Military technical college, Cairo, Egypt

**11:24am** Development and Analysis of Robotic Arms for Humanoid Melo

Technical Paper Publication. IMECE2018-87987

**He Shen**, California State University, Los Angeles, Los Angeles, CA, United States, **Salvador Rojas**, California State University, Los Angeles, Whittier, CA, United States, **Eduardo Molina**, **Francisco Moxo Galicia**, **Ni Li**, California State University, Los Angeles, Los Angeles, CA, United States

## 6-5 FLUID-STRUCTURE INTERACTION

### 6-5-1 Fluid-Structure Interaction I

Room 310 10:00am - 11:45am

Session Chair: **Marco Amabili**, McGill University, Montreal, QC, Canada

**10:00am** Developing an Advance Tire Hydroplaning Model Using Co-Simulation of Fully Coupled FEM and CFD Codes to Estimate Cornering Force

Technical Paper Publication. IMECE2018-86581

**Ashkan Nazari**, Virginia Tech, Blacksburg, VA, United States, **Lu Chen**, University at Buffalo, SUNY Buffalo, NY, United States, **Francine Battaglia**, University at Buffalo, Buffalo, NY, United States, **Saied Taheri**, Virginia Tech, Blacksburg, VA, United States

**10:21am** Experimental and CFD Investigation of Aerodynamic Forces and Moments in a Linear Turbine Blade Cascade

Technical Paper Publication. IMECE2018-86667

**Vaclav Slama**, Doosan Skoda Power, Pilsen, Czech Republic, **Jiri Ira**, NUM Solution s.r.o., Prague, Czech Republic, **Petr Eret**, University of West Bohemia, Pilsen, Czech Republic, **Bartolomej Rudas**, Doosan Skoda Power, Pilsen, Czech Republic, **Ales Macalka**, NUM Solution, Prague, Czech Republic, **Volodymyr Tsybalyuk**, University of West Bohemia, Pilsen, Czech Republic

**10:42am** Effect of Speed on the Performance Characteristics of Non-Recessed Worn Hybrid Conical Journal Bearing for Different Semi Cone Angles

Technical Paper Publication. IMECE2018-87734

**Sanjay Pawar**, VJTI Mumbai India, Mumbai, Maharashtra, India, **Vikas Phalle**, VJTI, MUMBAI, Mumbai, Maharashtra, India, **Sangram Patil**, Veermata Jijabai Technological Institute, Mumbai, Maharashtra, India

**11:03am** EXPERIMENTS ON NONLINEAR VIBRATIONS OF A NUCLEAR FUEL ROD IN AIR AND IN WATER  
Technical Presentation. IMECE2018-88755

**Marco Amabili**, **Prabakaran Balasubramanian**, **Giovanni Ferrari**, McGill University, Montreal, QC, Canada, **Kostas Karazis**, Framatome, Lynchburg, VA, United States, **Brian Painter**, Framatome Ltd, Lynchburg, VA, United States

**11:24am** A numerical study of VIV suppression using a rotative non-linear vibration absorber (NVA) and a wake-oscillator model

Technical Presentation. IMECE2018-88767

**Tatiana Ueno**, University of São Paulo, Lins, São Paulo, Brazil, **Guilherme Franzini**, University of São Paulo, São Paulo, São Paulo, Brazil

## 6-6 VIBRATION, NOISE CONTROL AND DAMPING TECHNOLOGIES

### 6-6-1 Vibration, Noise Control and Damping Technologies I

Third Floor, David L. Lawrence Convention Center, Room 308 10:00am - 11:45am

Session Chair: **Robley G. Kirk**, Virginia Tech, CHRISTIANSBURG, VA, United States

**10:00am** Maxwell-Voigt and Voigt Models for Vibration Isolation: Influence of Fractional Damping and Time Delay

Technical Paper Publication. IMECE2018-86089

**Sudhakar**, Western Carolina University, Cullowhee, NC, United States

**10:21am** A Vertical Seismometer With Build-in Retroreflector for Absolute Gravimetry

Technical Paper Publication. IMECE2018-86136

**Meiyong Guo**, **Kang Wu**, **Jiamin Yao**, **Jin Qian**, **Lijun Wang**, Tsinghua University, Beijing, China

**10:42am** Improved Design Tool for Thermal Synchronous Instability

Technical Paper Publication. IMECE2018-86142

**Robley G. Kirk**, Virginia Tech, CHRISTIANSBURG, VA, United States, **Wen Jeng Chen**, Eigen Technologies, Inc., Davidson, NC, United States

**11:03am** An Energy-Regenerative Suspension System

Technical Paper Publication. IMECE2018-86143

**Thomas Lato**, University of Ontario Institute of Technology, Oshawa, ON, Canada, **Huiyong Zhao**, Hubei University of Automotive Technology, Shiyan, Hubei Province, China, **Lin Zhao**, University of Ontario Institute of Technology, Oshawa, ON, Canada, **Yuping He**, University of Ontario Inst of Tech, Oshawa, ON, Canada

**11:24am Energy Absorption Mechanisms and Crash Analysis of Helicopter Seats**

Technical Paper Publication. IMECE2018-86220

*Gulce Ozturk, Turkish Aerospace Industries, Ankara, Ankara, Turkey, Altan Kayran, METU Center for Wind Energy, Ankara, Turkey*

**6-7 DYNAMICS AND CONTROL IN MICRO/NANO ENGINEERING**

**6-7-1 Dynamics and Control in Micro/Nano Engineering I**

**Third Floor, David L. Lawrence Convention Center, Room 309 10:00am - 11:45am**

Session Chair: **Dumitru Caruntu**, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Chair: **Marco Amabili**, *McGill University, Montreal, QC, Canada*, **Saad Ilyas**, *King Abdullah Univ of Science & Tech, Thuwal, Select State/Province, Saudi Arabia*

**10:00am Bouncing Dynamics of Cantilever-Type NEM Switches Considering Tip-Substrate Contact**

Technical Paper Publication. IMECE2018-87124

*Mohamed Bognash, University of Western Ontario, London, ON, Canada, Samuel Asokanathan, Univ Of Western Ontario, London, ON, Canada*

**10:21am Evaluation of Tribological Properties of Graphene Oxide Dispersed Liquid Paraffin Oil**

Technical Paper Publication. IMECE2018-87346

*Bhavyanidhi Vats, Monika Singh, Moradabad Institute of Technology, MORADABAD, wazirpur, India, Anuj Gupta, Gautam Buddha University, Delhi, India*

**10:42am Frequency Response for MEMS Circular Plate Resonators Under Superharmonic Resonance of the Second Order**

Technical Paper Publication. IMECE2018-87823

*Martin Botello, Julio Beatriz, Dumitru Caruntu, University of Texas Rio Grande Valley, Edinburg, TX, United States*

**11:03am INVESTIGATING SIMULTANEOUS EXCITATION OF PRIMARY AND SUBHARMONIC RESONANCE ON A DOUBLY CLAMPED MEMS MICROBEAM**

Technical Presentation. IMECE2018-88976

*Saad Ilyas, King Abdullah Univ of Science & Tech, Thuwal, Select State/Province, Saudi Arabia, Feras Alfossail, Mohammad Younis, King Abdullah University of Science, Thuwal, Saudi Arabia*

**11:24am Analytical Study of Vibratory Transport under Spatially Asymmetric Motion**

Technical Presentation. IMECE2018-88707

*Jyayasi Nath, IIT Kharagpur, Kharagpur, India, Anirvan Dasgupta, Indian Institute of Technology Kharagpur, Kharagpur, Select State/Province, India*

**6-10 MULTIBODY DYNAMIC SYSTEMS AND APPLICATIONS**

**6-10-1 Multibody Dynamic Systems and Applications I**

**Third Floor, David L. Lawrence Convention Center, Room 306 10:00am - 11:45am**

Session Chair: **Shanzhong (shawn) Duan**, *Saint Martin's University, Lacey, WA, United States*

**10:00am A New Approach for Locating the Instantaneous Centers of Zero Velocity for 1-DOF Planar Linkages**

Technical Paper Publication. IMECE2018-86341

*Nadim Diab, Rafik Hariri University, Mount Lebanon, Lebanon*

**10:21am Identification of Vehicle Inertia Parameters: From Test Bench Design to Movement Trajectory Optimization**

Technical Paper Publication. IMECE2018-87545

*Di Yao, Kay Büttner, Günther Prokop, Dresden University of Technology, Dresden, Germany*

**10:42am Vibration Suppression in Two-Dimensional Oscillation Dynamical Systems**

Technical Paper Publication. IMECE2018-87858

*Adnan S. Saeed, Mohammad AL-Shudeifat, Khalifa University, Abu Dhabi, Abu Dhabi, United Arab Emir.*

**11:03am Multibody Dynamics Approaches for Study on Solid and Saturated Single-Body Vibrations**

Technical Paper Publication. IMECE2018-88485

*Shanzhong (shawn) Duan, Saint Martin's University, Lacey, WA, United States*

**11:24am Real-Time Simulation of Flexible Multibody Models in Real-Time**

Technical Presentation. IMECE2018-89504

*William Prescott, Siemens Product Lifecycle Management, Coralville, IA, United States*

**6-3 NONLINEAR DYNAMICS, CONTROL, AND STOCHASTIC MECHANICS**

**6-3-1 Nonlinear Dynamics, Control, and Stochastic Mechanics I**

**Third Floor, David L. Lawrence Convention Center, Room 309 1:45pm - 3:30pm**

Session Chair: **Dumitru Caruntu**, *University of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Chair: **Marco Amabili**, *McGill University, Montreal, QC, Canada*, **Bogdan Epureanu**, *University of Michigan, Ann Arbor, MI, United States*

**1:45pm** Design and Development of an Unmanned Underwater Vehicle (UUV) in the Form of a Cuttlefish  
Technical Paper Publication. IMECE2018-86530  
*Susheekumar Cherangara Subramanian, Thao Le, Jason Olson, Sandesh G. Bhat, Sangram Redkar, Arizona State University, Mesa, AZ, United States*

**2:06pm** Modal Damping and Frequency Variations in Nonlinearly Coupled Oscillators With Negative Linear Stiffness Components  
Technical Paper Publication. IMECE2018-87474  
*Fatima Alhammedi, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir., Mohammad AL-Shudeifat, Khalifa University, Abu Dhabi, Abu Dhabi, United Arab Emir.*

**2:27pm** Nonlinear damping in nonlinear vibrations  
Technical Presentation. IMECE2018-87718  
*Marco Amabili, McGill University, Montreal, QC, Canada*

**2:48pm** Voltage Response of Circular Plate MEMS Resonators Under Superharmonic Resonance  
Technical Paper Publication. IMECE2018-87766  
*Martin Botello, Julio Beatriz, Dumitru Caruntu, University of Texas Rio Grande Valley, Edinburg, TX, United States*

**3:09pm** Dynamic Model and Control Design for a Nonlinear Hydraulic Actuator  
Technical Paper Publication. IMECE2018-88320  
*Carlos Borrás Pinilla, Universidad Industrial De Santander-UIS, Bucaramanga, Colombia, José L. Sarmiento, Juan F. Orfíz, Universidad Industrial de Santander, Bucaramanga, Select State/Province, Colombia*

## **6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES**

### **6-4-5 Mechanism Design I**

**Third Floor, David L. Lawrence Convention Center, Room 307 1:45pm - 3:30pm**

Session Chair: **Yin-ping Chang**, *Oakland University, Rochester, MI, United States*

Session Co-Chair: **Sebastian Roa Prada**, *Universidad Autonoma de Bucaramanga, Bucaramanga, Santander, Colombia*

**1:45pm** Improving Motion Stability of the Plane 3-RPR Parallel Manipulator at Singular Configuration  
Technical Paper Publication. IMECE2018-86218  
*Yu-Tong LI, China University of Petroleum, Qingdao, China, Yuxin Wang, China University of Petroleum, Huadong, Qingdao, Shandong, China*

**2:06pm** Computational Design of a Bird-Inspired Perching Landing Gear Mechanism  
Technical Paper Publication. IMECE2018-86615  
*Paul Nadan, Franklin W. Olin College of Engineering, Needham, MA, United States, Christopher Lee, Franklin W Olin College of Engg, Needham, MA, United States*

**2:27pm** Motion Capture of the Selective Hand Picking Movements As the Basis for the Design of Mechanically Assisted Picking Tools in Coffee Plantations in Colombia  
Technical Paper Publication. IMECE2018-88428  
*Jeyson Andres Hernandez Barbosa, Sebastian Roa Prada, Universidad Autonoma de Bucaramanga, Bucaramanga, Santander, Colombia, Dario J. Hernandez Bolivar, Universidad Autónoma de Bucaramanga, Bucaramanga, Santander, Colombia, Brajan Nicolas Ruiz Romero, Oscar E. Rueda, Universidad Autonoma de Bucaramanga, Bucaramanga, Santander, Colombia*

**2:48pm** Design and Construct a Portable, Low Cost, Ankle Foot Rehabilitation Device  
Technical Presentation. IMECE2018-89433  
*Ahmad Alshorman, Jordan University of Science and Technology, Irbid, Jordan*

**3:09pm** The Virtual Cam: Hexagon Method Authentication on Locating Key Instant Centers of All Planar Single Degree of Freedom Kinematically Indeterminate Linkages up to Ten-Bar  
Technical Paper Publication. IMECE2018-87802  
*Zhengqi Liu, FCA, Rochester, MI, United States, Yin-ping Chang, Oakland University, Rochester, MI, United States*

## **6-5 FLUID-STRUCTURE INTERACTION**

### **6-5-2 Fluid-Structure Interaction II**

**Room 310 1:45pm - 3:30pm**

Session Chair: **Marco Amabili**, *McGill University, Montreal, QC, Canada*

**1:45pm** Aerodynamics Analysis for Optimization the Design of a Baja SAE Chassis  
Technical Paper Publication. IMECE2018-88027  
*Jessica Gissella Maradey Lazaro, Universidad Autã³Noma De Bucaramanga, Bucaramanga, Colombia, Sergio Andrés Ardila Gómez, Universidad Autonoma de Bucaramanga, Bucaramanga, Select State/Province, Colombia, Helio Sneyder Esteban Villegas, Universidad Autónoma de Bucaramanga, Bucaramanga, Select State/Province, Colombia*

**2:06pm** Active Control of a Two-Dimensional Nonlinear Wing Encountering a Gust  
Technical Paper Publication. IMECE2018-88456  
*XIAOYANG ZHANG, Mojtaba Kheiri, Concordia University department of MIAE, Montreal, QC, Canada, Wen-Fang Xie, Concordia University, Montreal, QC, Canada*

**2:27pm** Investigation of Temperature Effect on Cracked Pressurized Pipes  
Technical Paper Publication. IMECE2018-88572  
*karim egab, University of Mazaya, Nassiriyah, Nassiriyah, Iraq, Saad Oudah, Yeasin Bhuiyan, University of south carolina, Columbia, SC, United States, Ameen Nassar, University of Basrah, Basrah, Iraq, H. R Hassan, Mazaya University, Thiqar, Iraq*

**2:48pm**      **2 DOF Vortex-Induced Vibration Response and Energy Harvesting of Slender Marine Structures**  
Technical Presentation. IMECE2018-89060  
*Jing Xu, Menglan Duan, Yingying Wang, China University of Petroleum (Beijing), Beijing, China*

**3:09pm**      **Research Efforts on Aeroelasticity Effects in Airborne Diesel Engine Turbochargers**  
Technical Presentation. IMECE2018-89589

*Ryan C. McGowan, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, United States, Muthuvel Murugan, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, United States, Michael T. Szedlmayer, Kenneth S. Kim, Kurt M. Kruger, David J. Gondol, Chol-Bum M. Kweon, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, United States, Peter J. Clerkin, Environmental Research Group, Aberdeen Proving Ground, MD, United States, Rik D. Meininger, Science Applications International Corporation, Redstone Arsenal, AL, United States, Joseph A. Gibson, Khanh Q. Dang, Christopher A. Lindsey, Bernard N. Acker, U.S. Army Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL, United States, Marshall R. Musser, Sigmatech, Inc., Huntsville, AL, United States*

## **6-6 VIBRATION, NOISE CONTROL AND DAMPING TECHNOLOGIES**

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### **6-6-2 Vibration, Noise Control and Damping Technologies II**

**Third Floor, David L. Lawrence Convention Center, Room 308**      **1:45pm - 3:30pm**

Session Chair: *Akintoye O. Oyelade, University of Lagos, Lagos, Nigeria*

**1:45pm**      **Energy Harvesting From a Vehicle Damper by Using Electromagnetic Transducers**  
Technical Paper Publication. IMECE2018-86774  
*Longhan Xie, Jiehong Li, South China University of Technology, Guangzhou, China*

**2:06pm**      **Rigid-Flexible Coupling Dynamic Modeling and Simulation of Ravigneaux Compound Planetary Gear Systems**  
Technical Paper Publication. IMECE2018-86787  
*yigong Lv, Yanfang Liu, Junbin Lai, Peng Dong, Beihang University, Beijing, China*

**2:27pm**      **Frequency Domain Non-Linear Modeling and Analysis of Liquid Filled Column Dampers**  
Technical Paper Publication. IMECE2018-86850  
*H. Sefa Kizilay, Ender Cigeroglu, Middle East Technical University, Ankara, Turkey*

**2:48pm**      **Vibration Prediction of Horizontal Axis Washing Machine Through FEA on Wooden and Concrete Floor**  
Technical Paper Publication. IMECE2018-87001  
*Sachin Nilawar, Whirlpool Of Inida Ltd, Pune, Maharashtra, India, Vasudeo Patil, Sushilkumar Vishwakarma, Whirlpool of India Ltd, Pune, Maharashtra, India*

**3:09pm**      **Numerical and Analytical Analyses of Bi-Stable Element as Negative Stiffness**  
Technical Paper Publication. IMECE2018-87175  
*Akintoye O. Oyelade, University of Lagos, Lagos, Nigeria*

## **6-10 MULTIBODY DYNAMIC SYSTEMS AND APPLICATIONS**

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### **6-10-2 Multibody Dynamic Systems and Applications II**

**Third Floor, David L. Lawrence Convention Center, Room 306**      **1:45pm - 3:30pm**

Session Chair: *Shanzhong (shawn) Duan, Saint Martin's University, Lacey, WA, United States*

**1:45pm**      **Modeling Stabilization of Crane and Ship by Gyroscopic Control Using the Moving Frame Method**  
Technical Paper Publication. IMECE2018-86165

*Josef Flatlandsmo, Western Norway University of Applied Sciences, Bergen, Hordaland, Norway, Torbjørn Smith, Ørjan Ommedal Halvorsen, Western Norway University of Applied Sciences, Bergen, Norway, Johnny Vinje, Western Norway University of Applied Sciences, Flora, Sogn og Fjordane, Norway, Thomas Impelluso, Western Norway University of Applied Sciences, Bergen, Norway*

**2:06pm**      **Modeling Crane Induced Ship Motion Using the Moving Frame Method**  
Technical Paper Publication. IMECE2018-86190

*Øystein Haveland, Paulo Alexander Jacobsen Jardim, Jan Tore Rein, Thomas Impelluso, Western Norway University of Applied Sciences, Bergen, Norway*

**2:27pm**      **Dynamic Comparison of a 3-Degrees-of-Freedom Parallel Manipulator With Multiple Dry Clearance Joints and With Lubricated Joints**  
Technical Paper Publication. IMECE2018-87016

*Haodong Zhang, Xianmin Zhang, Xuchong Zhang, Zhenhui Zhan, South China University of Technology, Guangzhou, China*

**2:48pm**      **A Variational Derivation of Equations of Motion With Contact Constraints Using SE(3)**  
Technical Paper Publication. IMECE2018-87126

*Hidenori Murakami, University of California, San Diego, San Diego, CA, United States, Takeyuki Ono, The National Defense Academy, Yokosuka, Japan*

**3:09pm**      **Development of Equations of Motion for a Stewart Platform Under Prescribed Mount Motion**  
Technical Paper Publication. IMECE2018-87253

*Takeyuki Ono, Ryosuke Eto, The National Defense Academy, Yokosuka, Japan, Junya Yamakawa, The National Defense Academy, Yokosuka 239 8686, Japan, Hidenori Murakami, University of California, San Diego, San Diego, CA, United States*

## 6-3 NONLINEAR DYNAMICS, CONTROL, AND STOCHASTIC MECHANICS

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### 6-3-2 Nonlinear Dynamics, Control, and Stochastic Mechanics II

Third Floor, David L. Lawrence Convention Center,  
Room 309 3:45pm - 5:30pm

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Session Chair: **Marco Amabili**, *McGill University, Montreal, QC, Canada*

Session Co-Chair: **Bogdan Epureanu**, *University of Michigan, Ann Arbor, MI, United States*, **Isaac Elishakoff**, *Florida Atlantic University, Boca Raton, FL, United States*

**3:45pm** **A Time-Frequency Domain Adaptive Control Approach for Vibration of Active Magnetic Bearing System**  
Technical Paper Publication. IMECE2018-86110

**Xuan Yao, Zhaobo Chen**, *Harbin Institute of Technology, Harbin, Heilongjiang, China*, **Xiaoxiang Liu**, *Beijing Institute of Control Engineering, Beijing, China*, **Yinghou Jiao**, *Harbin Institute of Technology, Harbin, Heilongjiang, China*

**4:06pm** **Optimal Vibration Control and Energy Scavenging Using Collocated Nonlinear Energy Sinks and Piezoelectric Elements**

Technical Paper Publication. IMECE2018-86299

**Zahra Nili Ahmadabadi**, *Dana Incorporated, Maumee, OH, United States*, **Siamak Esmailzadeh Khadem**, *Tarbiat Modares University, Tehran, Iran*

**4:27pm** **Control Analysis of a 2D Inverted Pendulum and Cart System for Stability in the Event of a Sensor Failure**

Technical Paper Publication. IMECE2018-87586

**Sarah Lamb**, *Stanley Black & Decker, Inc, New Britain, CT, United States*, **Patricia Mellodge**, **Kiwon Sohn**, **Akin Tatoglu**, *University of Hartford, West Hartford, CT, United States*

**4:48pm** **Multidimensional Integration Methods Used for Catastrophic Event Prediction Associated With Nonlinear Dynamic Responses of Road Vehicles**

Technical Paper Publication. IMECE2018-88009

**Jesus Gonzalez Anaya**, **Julian Dunne**, *University of Sussex, Brighton, United Kingdom*

**5:09pm** **Rigorous Implementation of the Galerkin Method for Stepped Columns**

Technical Presentation. IMECE2018-87779

**Isaac Elishakoff**, *Florida Atlantic University, Boca Raton, FL, United States*, **Damien Boutur**, *Sigma Clermont, Aubiere, France*

## 6-4 DESIGN AND CONTROL OF ROBOTS, MECHANISMS AND STRUCTURES

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### 6-4-6 Mechanism Design II

Third Floor, David L. Lawrence Convention Center,  
Room 307 3:45pm - 5:30pm

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Session Chair: **Hong Zhou**, *Texas A&M University-Kingsville, Kingsville, TX, United States*

Session Co-Chair: **Naoufel AZOUZ**, *University of Evry, Evry-Courcouronnes, France*

**3:45pm** **Modelling Subsea ROV Motion Using the Moving Frame Method**

Technical Paper Publication. IMECE2018-86191

**Katrine Oen Austefjord**, **Linn-Kristin Skeide Larsen**, *Western Norway University of Applied Sciences, Bergen, Hordaland, Norway*, **Martin Hestvik**, *Høgskolen på Vestlandet, Kristiansund, MORE OG ROMSDAL, Norway*, **Thomas Impelluso**, *Western Norway University of Applied Sciences, Bergen, Norway*

**4:06pm** **Modelling and Design of an Airship Crane**

Technical Paper Publication. IMECE2018-87587

**Naoufel AZOUZ**, *University of Evry, Evry-Courcouronnes, France*, **Mahmoud KHAMLIA**, **Fida BENABDALLAH**, *University of Evry-Paris-Saclay, Evry-Courcouronnes, Select State/Province, France*, **Fatma GUESMI**, *Polytechnic School of Tunis, La Marsa, Select State/Province, Tunisia*

**4:27pm** **Path Generation Algorithm Verification of a 2-DOF Robot Arm With Linear Actuator Using MATLAB Sim-Mechanics**

Technical Paper Publication. IMECE2018-88185

**Ahmed Y. AbdelHamid**, *Military Technical College, Cairo, Egypt*, **Maged M. Abou Elyazed**, *Technical Research Center, Cairo, Egypt*, **Abdelrahman Zaghloul**, *McMaster University, Hamilton, ON, Canada*

**4:48pm** **Locomotion of Two-Mass Robot Using an Impulsive actuator**

Technical Presentation. IMECE2018-89432

**Ahmad Alshorman**, *Jordan University of Science and Technology, Irbid, Jordan*

**5:09pm** **Linkage Synthesis for Solar Tracking**

Technical Paper Publication. IMECE2018-86471

**Kavan Jani**, **Hong Zhou**, **Chung Leung**, *Texas A&M University-Kingsville, Kingsville, TX, United States*

## 6-6 VIBRATION, NOISE CONTROL AND DAMPING TECHNOLOGIES

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### 6-6-3 Vibration, Noise Control and Damping Technologies III

Third Floor, David L. Lawrence Convention Center,  
Room 308 3:45pm - 5:30pm

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Session Chair: **Ashok Belegundu**, *Pennsylvania State Univ, University Park, PA, United States*

Draft Program

**3:45pm**      **Optimized Vibration Suppression of Structural Floor Using Passive TMD**  
Technical Paper Publication. IMECE2018-87488  
*Zaman Chini, Haifeng Zhang, University of North Texas, Denton, TX, United States*

**4:00pm**      **Vibration Analysis of Washing Machines in Rotating Plane of Drum**  
Technical Paper Publication. IMECE2018-88632  
*Cem Baykal, Ender Cigeroglu, Middle East Technical University, Ankara, Turkey, Yigit Yazicioglu, Middle East Technical Univ, Ankara, Turkey*

**4:15pm**      **Optimal Design of a Segmented Tube With Side Branches for Noise Reduction**  
Technical Paper Publication. IMECE2018-88691  
*Ashok Belegundu, Pennsylvania State Univ, University Park, PA, United States, Michael Grissom, Soundless, LLC, State College, PA, United States*

**4:30pm**      **Quenching of Friction Induced Vibration by Tangential Acceleration Feedback Control**  
Technical Presentation. IMECE2018-88894  
*Jyayasi Nath, IIT Kharagpur, Kharagpur, India, Shyamal Chatterjee, IEST SHIBPUR, Howrah, India*

**4:45pm**      **Theoretical model for vibration reduction in human body-wheelchair system**  
Technical Presentation. IMECE2018-89523  
*Akihiro Yamamoto, Okayama Prefectural University Graduate School, Souja, Okayama, Japan, Shinichiro Ota, Okayama prefectural University, Souja, Okayama, Japan*

**5:00pm**      **Dynamic Analysis Rectangular Aluminium Plate Under Transverse Loading Using Finite Difference Algorithm**  
Technical Paper Publication. IMECE2018-86198  
*Michael Agarana, Covenant University., Ota, Ogun State, Nigeria, Esther Akinlabi, University of Johannesburg, JOHANNESBURG, GAUTENG PROVINCE, South Africa*

## **6-10 MULTIBODY DYNAMIC SYSTEMS AND APPLICATIONS**

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### **6-10-3 Multibody Dynamic Systems and Applications III**

**Third Floor, David L. Lawrence Convention Center, Room 306      3:45pm - 5:30pm**

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Session Chair: **Shanzhong (shawn) Duan**, *Saint Martin's University, Lacey, WA, United States*  
Session Co-Chair: **Isaac Elishakoff**, *Florida Atlantic University, Boca Raton, FL, United States*

**3:45pm**      **Steering Strategy for a Multi-Axle Wheeled Vehicles**  
Technical Paper Publication. IMECE2018-86323  
*Waqar Ahmed, National University of Sciences & Technology (College of Electrical & Mechanical Engineering), Islamabad, Pakistan, Sana Fatima, Raja Amer Azim, National University of Sciences and Technology, Islamabad, Pakistan*

**4:06pm**      **Finite Element Analysis of Contact Force Models During Solid Elastic and Plastic Bodies Impact**  
Technical Paper Publication. IMECE2018-87458  
*Gustavo Rodrigues, Universidade Estácio de Sá, Rio De Janeiro, Brazil, Hans Weber, Pontifical Catholic University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil, Larissa Driemeier, University of São Paulo, São Paulo, Brazil*

**4:27pm**      **Topology Optimization of an Anti Roll Bar of a Heavy Commercial Truck for Vehicle Dynamics and Durability**  
Technical Paper Publication. IMECE2018-87862  
*Ece Yenilmez, Ozyegin University, Istanbul, Turkey, ALI YASAR, Özye??n University, Çekmeköy/?stanbul, ?stanbul, Turkey, Po-lat SENDUR, Ozyegin University, Cekmekoy, ?stanbul, Turkey*

**4:48pm**      **Design Optimization and Dynamic Analysis of Elliptical Cross-Section Helical Spring**  
Technical Presentation. IMECE2018-89537  
*Majdi Gzal, Oleg Gendelman, Technion, Israel Institute of Technology, Haifa, Israel*

**5:09pm**      **Uncertainty Quantification of Edwards High-Pressure Pipe Behavior Using Complex System Thermal-Hydraulics Codes**  
Technical Paper Publication. IMECE2018-88053  
*Mojtaba Raheli Kaleibar, Sahand University of Technology, Tabriz, East Azarbaijan, Iran, Mohammad Pourgol-Mohammad, JCI/ Sahand University of Technology, York, PA, United States, Rahim Khoshbakhti Saray, Sahand University of Technology, Tabriz, East Azarbaijan, Iran, Seyed Mohsen Hoseyni, KTH Royal Institute of Technology, Stokholm, Sweden*

## **6-11 VIBRATION OF CONTINUOUS SYSTEMS**

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### **6-11-1 Vibrations of Continuous Systems I**

**Room 310      3:45pm - 5:30pm**

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Session Chair: **Dumitru Caruntu**, *University of Texas Rio Grande Valley, Edinburg, TX, United States*  
Session Co-Chair: **Marco Amabili**, *McGill University, Montreal, QC, Canada, Berkan Alanbay, Virginia Tech, Blacksburg, VA, United States*

**3:45pm**      **Vibration of Curvilinearly Stiffened Plates Using Ritz Method With Orthogonal Jacobi Polynomials**  
Technical Paper Publication. IMECE2018-86871  
*Berkan Alanbay, Karanpreet Singh, Rakesh Kapania, Virginia Tech, Blacksburg, VA, United States*

**4:06pm**      **Dynamic Analysis and Parametric Excitation of a Multi-Span Beam Structure Coupled With a Sequence of Moving Rigid Bodies**  
Technical Paper Publication. IMECE2018-87181  
*Hao Gao, University of Southern California, Los Angeles, CA, United States, Bingen (ben) Yang, Univ Of Southern California, Los Angeles, CA, United States*

**4:27pm Parametric Instability of Planetary Gear Transmission Mounted on Discrete Support Struts With Minimum Ring Gear Rim Thickness Design**

**Technical Paper Publication.** IMECE2018-87220

*Peng Guan, The University of Tennessee, Dublin, OH, United States, Hans Desmidt, The University Of Tennessee, Knoxville, TN, United States*

**4:48pm Parametric Resonance of Electrostatically Actuated MEMS Cantilever Resonators: Homotopy Analysis Method Versus the Method of Multiple Scales**

**Technical Paper Publication.** IMECE2018-88015

*Dumitru Caruntu, University Of Texas Rio Grande Valley, Edinburg, TX, United States, Christopher Reyes, The University of Texas Rio Grande Valley, Edinburg, TX, United States*

**5:09pm A Simple Spring-Loaded Inverted Pendulum (Slip) Model of a Bio-Inspired Quadrupedal Robot Over Compliant Terrains**

**Technical Paper Publication.** IMECE2018-87134

*Hasti Hayati, UTS, Sydney, NSW, Australia, Paul Walker, University of Technology, Sydney (UTS), Ultimo, NSW, Australia, Terry Brown, University of Technology Sydney (UTS), Ultimo, NSW, Australia, Paul Kennedy, University of Technology Sydney (UTS), Sydney, NSW, Australia, David Eager, University of Technology Sydney, Sydney, NSW, Australia*

**6-20 CONGRESS-WIDE SYMPOSIUM ON NDE &SHM: DYNAMICS, VIBRATION, AND CONTROL FOR STRUCTURAL HEALTH MONITORING APPLICATIONS**

**6-20-1 Dynamics, Vibration, and Control for Structural Health Monitoring Applications I**

**Third Floor, David L. Lawrence Convention Center, Room 305 3:45pm - 5:30pm**

Session Chair: *Andrei Zagrai, New Mexico Institute of Mining & Technology, Socorro, NM, United States*

**3:45pm Interfacial Strength Evaluation of Surface Coatings by Using Repeated Pulsed Laser Irradiations**

**Technical Presentation.** IMECE2018-86494

*Takeshi Yamada, Yusaku Saito, Kohei Kanamori, Akio Yonezu, Chuo University, Tokyo, Japan*

**4:06pm A Phase Spectrum Method for the Measurement of Liquid-Layer Thickness**

**Technical Paper Publication.** IMECE2018-87201

*Wenbin Huang, Quanchang Li, Junkai Ding, Chongqing University, Chongqing, China*

**4:27pm Negative Effective Stiffness Content in Cracked Rotors**

**Technical Paper Publication.** IMECE2018-87470

*Mohammad AL-Shudeifat, Khalifa University, Abu Dhabi, Abu Dhabi, United Arab Emir., Fatima Alhammad, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir.*

**4:48pm Electromechanical-Resonance-Based Self-Sensing in Metal-Cement Structures**

**Technical Presentation.** IMECE2018-88325

*Zhong Liang, University at Buffalo, The State University of New York, Buffalo, NY, United States, Deborah D.L. Chung, Univ At Buffalo, State Univ of NY, Buffalo, NY, United States*

**5:09pm Application of Electromechanical Impedance Method to Structural Health Monitoring of Composite Elements of Aerospace Structures**

**Technical Presentation.** IMECE2018-89507

*Aaron Mislá, New Mexico Institute of Mining and Technology, Socorro, NM, United States, Andrei Zagrai, New Mexico Institute of Mining & Technology, Socorro, NM, United States*

**Engineering Education  
WEDNESDAY, NOVEMBER, 14**

**7-13 ENGINEERING EDUCATION PLENARY**

**7-13-1 Engineering Education Plenary**

**Third Floor, David L. Lawrence Convention Center, Room 302 9:00am - 9:45am**

**9:00am Lessons and Perspectives on Transformational Engineering Education: Past, Present and Future**

**Plenary Presentation.** IMECE2018-90098

*Harvey Borovitz, University of Pittsburgh, Pittsburgh, PA, United States*

**7-2 GLOBALIZATION OF ENGINEERING**

**7-2-1 Globalization of Engineering**

**Third Floor, David L. Lawrence Convention Center, Room 317 10:00am - 11:45am**

Session Chair: *Subha Kumpaty, Milwaukee School of Engineering, Milwaukee, WI, United States*

**10:00am Temperature and Heat Flux Data-Logger for Use in Tunnel Ovens: An International Partnered Project**

**Technical Paper Publication.** IMECE2018-86076

*Alexander Watt, Jason Wichert, Justine Staniszewski, Nathaniel Nakles, Yvonne English, Mike Bright, Grove City College, Grove City, PA, United States, Michel Havet, ONIRIS, Nantes, France, Erik Bardy, Mark Reuber, Grove City College, Grove City, PA, United States*

**10:21am** Study on Functionally Gradient Materials Under International Research Experiences for Undergraduates Program: US - South Africa Collaboration

Technical Paper Publication. IMECE2018-86288

*Subha Kumpaty, Milwaukee School of Engineering, Milwaukee, WI, United States, Esther Akinlabi, University of Johannesburg, Johannesburg, South Africa, Sisa Pityana, Council of Scientific and Industrial Research, Pretoria, South Africa, Andrew Gray, Kevin Sivak, Milwaukee School of Engineering, Milwaukee, WI, United States, Mutiu F. Erinosh, University of Johannesburg, Johannesburg, South Africa*

**10:42am** Curricular Structure for a Mechanical Engineering Undergrad Program Based on Human Capabilities and Professional Competences

Technical Paper Publication. IMECE2018-88240

*Diego A. Flórez, Universidad Pontificia Bolivariana, MEDELLIN, Colombia*

**11:03am** Motivational Tools for Engineering Students in Privileged Developing Countries: Examples From UAE

Technical Paper Publication. IMECE2018-88499

*Bashar El-Khasawneh, Khalifa University, Abu Dhabi, OO, United Arab Emir.*

**11:24am** Gender Climate and Gender Experience in Engineering Education

Technical Presentation. IMECE2018-86385

*Jan Fertig, Subha Kumpaty, Milwaukee School of Engineering, Milwaukee, WI, United States*

**7-4 SYSTEMS ENGINEERING AND SUSTAINABLE ENGINEERING EDUCATION**

**7-4-1 Systems Engineering and Sustainable Engineering Education- I**

**Third Floor, David L. Lawrence Convention Center, Room 318 10:00am - 11:45am**

Session Chair: **Nael Barakat, Texas A&M Kingsville, Kingsville, TX, United States**

**10:00am** Application of Systems Engineering to Machine Design for Technology Students

Technical Paper Publication. IMECE2018-86713

*Anthony D Angelo, US Army ARDEC, Hillsborough, NJ, United States, Edwin K.P. Chong, Colorado State University, Ft. Collins, CO, United States*

**10:21am** Technology on Trial: The Social Framework of Safe Design

Technical Paper Publication. IMECE2018-87017

*W. P. Munsell, P.E., University of Oklahoma, Norman, OK, United States*

**10:42am** Assessing the Educational Effectiveness of a System Engineering Software in Capstone Design Projects

Technical Paper Publication. IMECE2018-87640

*Angran Xiao, New York City College of Technology, Yorktown Heights, NY, United States, Gaffar Gailani, Shaolin Zhang, New York City College of Technology, Brooklyn, NY, United States*

**11:03am** Development of a New Course on Microgrids and Distributed Energy Resources

Technical Paper Publication. IMECE2018-88506

*Sasan Haghani, University of the District of Columbia, Washington, DC, United States*

**7-5 APPLIED MECHANICS, DYNAMIC SYSTEMS AND CONTROL ENGINEERING**

**7-5-1 Applied Mechanics, Dynamic Systems and Control Engineering- I**

**Third Floor, David L. Lawrence Convention Center, Room 316 10:00am - 11:45am**

Session Chair: **Mohammad Mahinfalah, Milwaukee School of Engineering, Milwaukee, WI, United States**

**10:00am** Inspiring Learning: Assessment of Friction in a Real-World Model Using the Moving Frame Method in Dynamics

Technical Paper Publication. IMECE2018-86189

*Thorstein R Rykkje, University of Bergen, BERGEN, Hordaland, Norway, Erlend Bugge, western norway university of applied sciences, Bergen, Norway, Andreas Skjelde, Høgskolen på Vestlandet, Bergen, Hordaland, Norway, Daniel Leinebø, Thomas Impelluso, Western Norway University of Applied Sciences, Bergen, Norway*

**10:21am** Interactive Educational Testbed for Statics and Mechanics of Materials

Technical Paper Publication. IMECE2018-87938

*Zhelong He, Qingchang Liu, Katherine Yang, Niemann Pest, University of Virginia, Charlottesville, VA, United States, Baoxing Xu, University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States, Jason Kerrigan, University of Virginia, Charlottesville, VA, United States, Marek-Jerzy Pindera, University Of Virginia, Charlottesville, VA, United States*

**10:42am** Developing and Implementing a Projectile Launching Mechanism During a Senior Engineering Capstone Project to Demonstrate Advanced Projectile Motion Principles

Technical Presentation. IMECE2018-87173

*Edward Bednarz III, Wilkes University, Wilkes Barre, PA, United States, Debbie A. French, Wilkes University, Wilkes-Barre, PA, United States*

**11:03am** Derivation Of Rotation Matrix For Axis-Angle Representation Of Rotation Based On An Intuitive Interpretation Of Rotation Matrix To Be Taught In Robot Kinematics Courses

Technical Presentation. IMECE2018-89645

*Roshan Kumar Hota, Indian Institute of Technology, Kharagpur, Kharagpur, West Bengal, India, Kumar Cheruvu, Indian Institute of Technology Kharagpur, Kharagpur, India*

## **7-1 CURRICULUM INNOVATIONS, PEDAGOGY AND LEARNING METHODOLOGIES**

**7-1-1 Curriculum Innovations, Pedagogy and Learning Methodologies- I**

**Third Floor, David L. Lawrence Convention Center, Room 317 1:45pm - 3:30pm**

Session Chair: **Anabela Alves**, *University of Minho, Guimareves, Portugal*

Session Co-Chair: **Salim Azzouz**, *Midwestern State University, Wichita Falls, TX, United States*

**1:45pm** “Traditional, Active and Problem-Based Learning Methods Used to Improve an Undergraduate Biomechanics Course”

Technical Paper Publication. IMECE2018-87478

*Sally Shady, Stevens Institute of Technology, Hoboken, NJ, United States*

**2:06pm** User Centered Design Applied to the Improvement of Fine Motor Skills

Technical Paper Publication. IMECE2018-88107

*Carolina Castro Alarcon, National Autonomous University of Mexico, Mexico City, Mexico, Santiago Eduardo Castillo Cadena, Daniel Haro Mendoza, UNAM, Mexico city, Mexico, Alejandro Ramirez-Reivich, National Autonomous University of Mexico, Distrito Federal, Mexico, Vicente Borja Ramirez, Facultad de Ingenieria - UNAM, México, Distrito Federal, Mexico, Arturo Treviño Arizmendi, National Autonomous University of Mexico, Periodista, Mexico, Jessica Daniela Vega Bello, National Autonomous University of Mexico, Venustiano Carranza, Mexico, Yesica Escalera Matamoros, National Autonomous University of Mexico, Coyoacan, Mexico*

**2:27pm** Integrating Collaborative Robots in Engineering and Engineering Technology Programs

Technical Paper Publication. IMECE2018-88147

*Ana Djuric, Jeremy Rickli, Wayne State University, Detroit, MI, United States, John P Sefcovic, Oakland Community College, Auburn Hill, MI, United States, Donald Hutchison, Oakland Community College, Auburn Hills, MI, United States, Michael M Goldin, Oakland Community College, Auburn Hill, MI, United States*

**2:48pm** Understanding Mathematical Definitions of Circularity/Roundness in ASME GD&T Y14.5 As Related to Part Functionality

Technical Paper Publication. IMECE2018-87148

*Chittaranjan Sahay, University of Hartford, Glastonbury, CT, United States, Suhash Ghosh, Mechanical Engineering, University of Hartford, West Hartford, CT, United States*

## **7-4 SYSTEMS ENGINEERING AND SUSTAINABLE ENGINEERING EDUCATION**

**7-4-2 Systems Engineering and Sustainable Engineering Education- II**

**Third Floor, David L. Lawrence Convention Center, Room 318 1:45pm - 3:30pm**

Session Chair: **Emine Celik Foust**, *York College of Pennsylvania, York, PA, United States*

**1:45pm** Devices to Aid Mobility: Biomedical Engineering-Focused Undergraduate Senior Capstone Design Projects

Technical Paper Publication. IMECE2018-86826

*Lara Thompson, Jiajun Xu, University of the District of Columbia, Washington, DC, United States, Devdas Shetty, University of District of Columbia, Washington DC, DC, United States*

**2:06pm** Measuring the Impact of a New Mechanical Engineering Sophomore Design Course on Students' Systems Thinking Skills

Technical Paper Publication. IMECE2018-87624

*Cassandra Degen, South Dakota School of Mines & Technology, Rapid City, SD, United States, Karim H. Muci-Kuchler, South Dakota School of Mines and Technology, Rapid City, SD, United States, Mark Bedillion, Carnegie Mellon University, Gibsonia, PA, United States, Shaobo Huang, South Dakota School of Mines and Technology, Rapid City, SD, United States, Marius D. Ellingsen, VRC Metal Systems, Rapid City, SD, United States*

**2:27pm** “Student Learning Projects in Sustainable Energy: Solar-Powered Algae Culture, Photovoltaics, and CO2 Capture”

Technical Paper Publication. IMECE2018-88404

*Michael Mauk, Richard Chiou, Carlos Ruiz, Jean Espaillet, Senyu Wang, Ainhua Garcia, Robert Surette, Drexel University, Philadelphia, PA, United States*

**2:48pm** REvolutionizing Mechanical Engineering Departments

Technical Presentation. IMECE2018-89725

*Yen-Lin Han, Seattle University, Seattle, WA, United States, Edward Berger, Elizabeth Briody, Purdue University, West Lafayette, IN, United States, Kathleen Cook, Greg Mason, Seattle University, Seattle, WA, United States, Edward Morrison, Purdue University, West Lafayette, IN, United States, Teodora Shuman, Seattle University, Seattle, WA, United States, Jennifer Turns, University of Washington, Seattle, WA, United States, Elizabeth Wirtz, Purdue University, West Lafayette, IN, United States*

## 7-5 APPLIED MECHANICS, DYNAMIC SYSTEMS AND CONTROL ENGINEERING

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### 7-5-2 Applied Mechanics, Dynamic Systems and Control Engineering- II

Third Floor, David L. Lawrence Convention Center,  
Room 316 1:45pm - 3:30pm

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Session Chair: **Mohammad Mahinfalah**, *Milwaukee School of Engineering, Milwaukee, WI, United States*

**1:45pm Rattlebacks for Undergraduate Engineers: Modelling Complex Behavior Using Introductory Dynamics and Numerical Methods**

Technical Paper Publication. IMECE2018-86580  
*Simon Jones, Kirby Kern, Rose-Hulman Institute of Technology, Terre Haute, IN, United States*

**2:06pm Robotic Polishing of Free-Form Surfaces With Controlled Force and Effective Path Planning**

Technical Paper Publication. IMECE2018-87371  
*Imran Mohsin, Shenzhen Institutes of Advanced Technology, Shenzhen, China, Kai He, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, Shenzhen, China, Ruxu Du, Chinese University Of Hong Kong, Hong Kong, Hong Kong*

**2:27pm A Consistent Approach to Problem Solving in Mechanical Vibrations**

Technical Paper Publication. IMECE2018-88241  
*Amir Danesh Yazdi, Penn State University, Erie, PA, United States, Yi Wu, Penn State Univ, Erie, PA, United States, Onidipo Onipede, Penn State Univ Erie, The Behrend College, Erie, PA, United States*

**2:48pm A Material Model Fitting for Recycled Polyethylene Terephthalate Implemented in the Finite Element Modelling**

Technical Paper Publication. IMECE2018-88305  
*DIEGO FERNANDO MESA VARGAS, UNIVERSIDAD DE GUANAJUATO, SALAMANCA, Mexico, AGUSTIN VIDAL-LESSO, UNIVERSIDAD DE GUANAJUATO-DICIS, SALAMANCA, Mexico, JORGE ARTURO ALFARO AYALA, UNIVERSIDAD DE GUANAJUATO, GUANAJUATO, GUANAJUATO, Mexico*

## 7-1 CURRICULUM INNOVATIONS, PEDAGOGY AND LEARNING METHODOLOGIES

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### 7-1-2 Curriculum Innovations, Pedagogy and Learning Methodologies- II

Third Floor, David L. Lawrence Convention Center,  
Room 317 3:45pm - 5:30pm

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Session Chair: **Anabela Alves**, *University of Minho, Guimareves, Portugal*

Session Co-Chair: **Celina P. Leao**, *University of Minho, Guimaraes, Portugal*

**3:45pm Dealing With the Studentsâ?? Profile Diversity in an Industrial Engineering and Management Program: PBL vs â??Non-PBLâ??**

Technical Paper Publication. IMECE2018-86368  
*Anabela Alves, University of Minho, Guimareves, Portugal, Francisco Moreira, University of Minho, Guimarâes, — Select One —, Portugal, Celina P. Leao, University of Minho, Guimaraes, Portugal*

**4:06pm Blended Learning by Gamification in a Second-Year Introductory Engineering Design Course**

Technical Paper Publication. IMECE2018-86879  
*Alyona Sharunova, Ahmed Ead, Christopher Robson, Mishra Afaq, University of Alberta, Edmonton, Alberta, AB, Canada, Pierre Mertiny, University of Alberta, Edmonton, AB, Canada*

**4:27pm Effectiveness of Evidence-Based Active Learning Pedagogies in Engineering Technology Courses**

Technical Paper Publication. IMECE2018-87656  
*Mohsen Ayoobi, Wayne State University, Detroit, MI, United States, Mukasa Ssemakula, Wayne State Univ, Detroit, MI, United States, Ana Djuric, Wayne State University, Detroit, MI, United States*

**4:48pm A Reflection of a Pedagogic Approach in an Engineering Course**

Technical Paper Publication. IMECE2018-88538  
*Manuel Eduardo Ferreira, University Of Minho, Guimaraes, Portugal, Joao Ferreira, Metric?s, Guimaraes, Portugal, Celina P. Leao, University of Minho, Guimaraes, Portugal*

**5:09pm Development of a Hybrid Heat and Mass Transfer Course**

Technical Paper Publication. IMECE2018-87934  
*June Mendez, Indiana University-Purdue University Columbus, Columbus, IN, United States*

## 7-9 PRE-COLLEGE (K-12) STEM, RET - UNIVERSITY, SCHOOL AND INDUSTRY ALLIANCE (IN HONOR OF LATE PROFESSOR DEVDAS PAI)

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**7-9-1 K-12 STEM, RET- University, School and Industry Alliance, Session in honor of Late Professor Devdas Pai**

Third Floor, David L. Lawrence Convention Center,  
Room 318 3:45pm - 5:30pm

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Session Chair: **Subha Kumpaty**, *Milwaukee School of Engineering, Milwaukee, WI, United States*

**3:45pm Development of a Multidisciplinary Engineering Research Program for Middle/High School Teachers**

Technical Paper Publication. IMECE2018-86411  
*Wen Li, Joshua Kim, Drew Kim, Michigan State University, East Lansing, MI, United States, Adam Alster, Renaissance High School, Detroit, MI, United States, Marianne Livezey, Pontiac High School, Pontiac, MI, United States, Tuyen Duddles, Macomb Math and Science, Warren, MI, United States*

**4:06pm Collaborative Multidisciplinary Engineering Design Experiences in IoT (Internet of Things) for Teachers Through Summer Research Site Program**

Technical Paper Publication. IMECE2018-87491

*Hyoung Jin Cho, Univ. Of Central Florida, Orlando, FL, United States, Alireza Karbalaeei, Damla Turgut, Melissa Dagley, Eleazar Vasquez III, University of Central Florida, Orlando, FL, United States*

**4:27pm Mechanical Engineering Student Developed Lego Engineering Design Learning Activity for 6th Grade Science Students**

Technical Paper Publication. IMECE2018-87499

*Heather Lai, Suny New Paltz, New Paltz, NY, United States, Laura Bryant, New Paltz Middle School, New Paltz, NY, United States*

**4:48pm A Project-Based Learning Stem Program for Middle and High School Students**

Technical Paper Publication. IMECE2018-88647

*Mohamed Gharib, G. Benjamin Cieslinski, Jowaher Al-Marri, Brady Creel, Texas A&M University at Qatar, Doha, Qatar*

**5:09pm Experiential learning in STEM at the University of the District of Columbia(UDC) through the Implementation of the first UDC Firebird Rover for the NASA Human Exploration Rover Challenge**

Technical Presentation. IMECE2018-88700

*Jiajun Xu, Sasan Haghani, University of the District of Columbia, Washington, DC, United States*

**7-12 ENGINEERING RESEARCH INNOVATION AND RESEARCH EXPERIENCE FOR UNDERGRADUATES**

**7-12-1 Engineering Research Innovation**

**Third Floor, David L. Lawrence Convention Center, Room 316 3:45pm - 5:30pm**

Session Chair: *Nazmul Islam, Univ of Texas Rio Grande Valley, Edinburg, TX, United States*

**3:45pm Development and Testing of a Lab-Scale Air-Gap Membrane Distillation Unit for Water Desalination**

Technical Paper Publication. IMECE2018-87088

*Reza Baghaei Lakeh, Keaton Cornell, Benny Ly, Aaron Chan, Cal Poly Pomona, Pomona, CA, United States, Sepideh Jankhah, Sterlitech Corp., Kent, WA, United States*

**4:06pm Design of Instruments for Mechanical Testing of 3D Printed Parts**

Technical Presentation. IMECE2018-87115

*Serdar Tumkor, Jonathan Holman, Jace, M. Rearick, University of Pittsburgh, Johnstown, PA, United States*

**4:27pm Outcomes of the Student Mentoring and Research Training (SMART) Program**

Technical Paper Publication. IMECE2018-88684

*Nazmul Islam, Univ of Texas Rio Grande Valley, Edinburg, TX, United States, Amy Weimer, University of Texas Rio Grande Valley (UTRGV), Edinburg, TX, United States*

**4:48pm 3D Food Printing Insights and Opportunities: A Capstone Design Case Study**

Technical Presentation. IMECE2018-88770

*Joseph Piacenza, University of West Florida, Pensacola, FL, United States, Hope Weiss, Monika Patel, Sean Moore, Tam Nguyen, California State University Fullerton, Fullerton, CA, United States*

**5:09pm The concept of integrated research in engineering education**

Technical Presentation. IMECE2018-88887

*Mohammad Asaduzzaman Chowdhury, Dhaka University of Engrg & Tech, Gazipur, Gazipur, Bangladesh, Bengir Ahmed Shuvho, Dhaka University of Engineering & Technology, Dhaka, Bangladesh, Uttam Kumar Debnath, Rajib Nandee, Dhaka University of Engineering and Technology, Gazipur, Gazipur, Bangladesh, Suman Das, University of Saskatchewan, Saskatchewan, SK, Canada, Atiqur Rahman, Bangladesh Road Transport Authority (BRTA), Dhaka, Bangladesh*

**THURSDAY, NOVEMBER, 15**

**7-8 DISTANCE/ONLINE ENGINEERING EDUCATION, MODELS AND ENABLING TECHNOLOGIES**

**7-8-1 Distance/Online Engineering, Models and Enabling Technologies- I**

**Third Floor, David L. Lawrence Convention Center, Room 316 8:55am - 10:30am**

Session Chair: *Mohammad Naraghi, Manhattan College, Bronx, NY, United States*

**8:55am Immersive Educational Systems With Procedure-Oriented Combinations of Real and Virtual Environments**

Technical Paper Publication. IMECE2018-86597

*Zhou Zhang, CUNY New York City College of Technology, Jersey City, NJ, United States, Shaolin Zhang, New York City College Of Technology, Brooklyn, NY, United States, Mingshao Zhang, Southern Illinois University Edwardsville, Edwardsville, IL, United States, Sven Esche, Stevens Institute Of Tech, Hoboken, NJ, United States*

**9:16am Virtual Teach Pendant Interface for Android Cellphones (VTPAC)**

Technical Paper Publication. IMECE2018-86865

*Giulia A. Ferri, Federal University of Technology, Curitiba, Parana, Brazil, Scott Walter, Asiri Tennakoon, Visual Components, Lake Orion, MI, United States, Ana Djuric, Wayne State University, Detroit, MI, United States*

**9:37am Real-Time Distance Courses to Improve Satisfaction and Competence: A Case Study of International Professors and Local Students**

Technical Paper Publication. IMECE2018-86877

*Martha Elena Núñez, Tecnológico de Monterrey, Puebla, Puebla, Mexico, Juan-Carlos Rojas, Tecnológico de Monterrey, Monterrey, Nuevo León, Mexico*

**9:58am** Assessing the Impact of Using Educational Videos in Teaching Engineering Courses  
Technical Paper Publication. IMECE2018-88216  
*Essam Zaneldin, UAE University, Al Ain, Al Ain, United Arab Emir., Waleed Ahmed, United Arab Emirates University, Al Ain, United Arab Emir.*

**10:19am** Development of a Virtual Objects Tool to Enhance Pedagogy of Thermodynamic Concepts  
Technical Presentation. IMECE2018-89415  
*Sathyanarayanan Subramanian, Virginia Tech, Blacksburg, VA, United States, Diana Bairaktarova, Virginia Polytechnic Institute and State University, Blacksburg, VA, United States, Scott Huxtable, Virginia Tech, Blacksburg, VA, United States*

## **7-10 TEACHING LABORATORIES, MACHINE SHOP EXPERIENCES, AND TECHNOLOGY-AIDED LECTURING**

### **7-10-1 Teaching Laboratories, Machine Shop Experiences and Technology-Aided Learning**

**Third Floor, David L. Lawrence Convention Center, Room 316 8:55am - 10:40am**

Session Chair: **Salim Azzouz**, *Midwestern State University, Wichita Falls, TX, United States*

**8:55am** Incorporating Student-Led Design Projects in Instrumentation and Measurements Laboratory  
Technical Paper Publication. IMECE2018-86055  
*Emine Celik Foust, York College of Pennsylvania, York, PA, United States*

**9:16am** Introduction of Prevention Engineering in Mechanical Engineering Curriculum  
Technical Presentation. IMECE2018-86447  
*Zbigniew Bzimek, University of Connecticut, Storrs, CT, United States*

**9:37am** A Gear-Chain Based Transmission for the Machine Elements Design Laboratory  
Technical Paper Publication. IMECE2018-87107  
*Salim Azzouz, Guy Bernard, Midwestern State University, Wichita Falls, TX, United States*

**9:58am** Manufacturing Science Laboratory: Robotic Ultrasonic Welding  
Technical Paper Publication. IMECE2018-88437  
*Michael Mauk, Richard Chiou, Carlos Ruiz, Prashant Yadav, Drexel University, Philadelphia, PA, United States*

**10:19am** A Proposed Engineering Curriculum for At Risk Students  
Technical Presentation. IMECE2018-88921  
*Louis Everett, Univ Of Texas El Paso, El Paso, TX, United States*

## **7-3 ENGINEERING ACCREDITATION, DATA COLLECTION, ASSESSMENT AND ABET**

### **7-3-1 Engineering Accreditation, Data Collection, Assessment and ABET Session I**

**Third Floor, David L. Lawrence Convention Center, Room 316 10:50am - 12:35pm**

Session Chair: **Amir Karimi**, *U. of Texas-San Antonio, San Antonio, TX, United States*

**10:50am** Sensitising Core Employability Skill Through Peer Assessment Approach  
Technical Paper Publication. IMECE2018-86056  
*Siddharthsinh Jadeja, Aditya Silver Oak Institute of Technology, Rajkot Gujarat, India, Sujata Wadhwa, FSO, Ahmedabad, India, Kapil Shukla, Silver Oak College of Engineering & Technology, Ahmedabad, India, Amit Ved, Marwadi University, Rajkot, India*

**11:11am** An Excel Add-in for Accreditation Data Collection and Auto Grading Sheets (AGS): A Canadian Experience  
Technical Paper Publication. IMECE2018-88096  
*Mohamed Ismail, University of Regina, Regina, SK, Canada*

**11:32am** Improving Engineering Students' College Math Readiness by MSEIP Summer Bridge Program  
Technical Paper Publication. IMECE2018-88685  
*Nazmul Islam, Univ of Texas Rio Grande Valley, Edinburg, TX, United States, Yong Zhou, University of Texas Rio Grande Valley (UTRGV), Edinburg, TX, United States*

**11:53am** Implementation of a New Student Outcome Assessment and Continuous Improvement Procedure for ABET-ETAC at SUNY Morrisville  
Technical Presentation. IMECE2018-88855  
*Mehmet Murat Baysal, SUNY Morrisville State College, Morrisville, NY, United States*

## **7-8 DISTANCE/ONLINE ENGINEERING EDUCATION, MODELS AND ENABLING TECHNOLOGIES**

### **7-8-2 Distance/Online Engineering, Models and Enabling Technologies- II**

**Third Floor, David L. Lawrence Convention Center, Room 317 10:50am - 12:35pm**

Session Chair: **Mohammad Naraghi**, *Manhattan College, Bronx, NY, United States*

**10:50am** Development of Telepresence Teaching Robots With Social Capabilities  
Technical Paper Publication. IMECE2018-86686  
*Mingshao Zhang, Pengji Duan, Southern Illinois University Edwardsville, Edwardsville, IL, United States, Zhou Zhang, CUNY New York City College of Technology, Jersey City, NJ, United States, Sven Esche, Stevens Institute Of Tech, Hoboken, NJ, United States*

**11:11am**                    **The Positive Effects of Using Social Networks in Courses of Applied Mechanics on Students's Performance**

**Technical Paper Publication.** IMECE2018-87217

*Miguel X. Rodriguez-Paz, Jorge A. Gonzalez-Mendivil, Tecnológico de Monterrey, Puebla, Mexico, J. Asuncion Zarate-Garcia, Tecnológico de Monterrey, Puebla, Puebla, Puebla, Mexico, Luis O. Peña-Ortega, Tecnológico de Monterrey, Puebla, Puebla, Mexico*

**11:32am**                    **Assessment of Three Dimensional CAD Models Using CAD Application Programming Interface**

**Technical Paper Publication.** IMECE2018-87776

*Sung-hwan Joo, Grand Valley State University, Grand Rapids, MI, United States*

**11:53am**                    **Student Engagement through Service Learning Project**

**Technical Presentation.** IMECE2018-89923

*Shah Alam, Texas A&M University-Kingsville, Kingsville, TX, United States, Ulan Dakeev, Texas A&M University - Kingsville, Kingsville, TX, United States*

### **7-3 ENGINEERING ACCREDITATION, DATA COLLECTION, ASSESSMENT AND ABET**

**7-3-2 Engineering Accreditation, Data Collection, Assessment and ABET Session II**

**Third Floor, David L. Lawrence Convention Center, Room 316    2:05pm - 3:50pm**

Session Chair: **Amir Karimi**, *U. of Texas-San Antonio, San Antonio, TX, United States*

**2:05pm**                    **OBACIS Analytics: The Catalogs**

**Technical Paper Publication.** IMECE2018-88168

*Mohamed Ismail, University of Regina, Regina, SK, Canada*

**2:26pm**                    **Cooperation of Three Faculty Members in Assessment of Student Knowledge in Two Sections of an Undergraduate Course**

**Technical Presentation.** IMECE2018-89562

*Amir Karimi, U. of Texas-San Antonio, San Antonio, TX, United States, Ender Finol, Randall Manteufel, The University of Texas at San Antonio, San Antonio, TX, United States*

**2:47pm**                    **Implementing the Wright State Model for Engineering Mathematics at University of Detroit Mercy**

**Technical Presentation.** IMECE2018-89513

*Shuvra Das, Univ Of Detroit Mercy, Detroit, MI, United States*

**3:08pm**                    **Mechanical Systems Senior Capstone Design Course Experiences**

**Technical Presentation.** IMECE2018-89261

*Raghu Echempati, Kettering Univ, Flint, MI, United States*

### **7-7 PROBLEM SOLVING IN ENGINEERING EDUCATION, RESEARCH AND PRACTICE**

**7-7-1 Problem Solving in Engineering Education, Research and Practice-I**

**Third Floor, David L. Lawrence Convention Center, Room 315    2:05pm - 3:50pm**

Session Chair: **Zbigniew Bzymek**, *University of Connecticut, Storrs, CT, United States*

**2:05pm**                    **Finite Element Educational Program Improves Mechanical Engineering Technology Student Performance in the Finite Element Class**

**Technical Paper Publication.** IMECE2018-86583

*Serdar Ozlek, New York City College of Technology, CUNY, Brooklyn, NY, United States*

**2:26pm**                    **Effective Approach to Teaching Stress and Deformation Analysis in Mechanical Engineering Design**

**Technical Paper Publication.** IMECE2018-86732

*Zbigniew Bzymek, University of Connecticut, Storrs, CT, United States*

**2:47pm**                    **Post-Graduation Assessment of the Effectiveness of an Industrially Sponsored Senior Design Capstone Course**

**Technical Paper Publication.** IMECE2018-86812

*Vito Moreno, University of Connecticut, Storrs, CT, United States, Bryan Weber, Thomas Barber, University of Connecticut, Storrs, CT, United States*

**3:08pm**                    **The Effect of Psychological Strategies in Engineering Education**

**Technical Presentation.** IMECE2018-88925

*Mohammad Asaduzzaman Chowdhury, Dhaka University of Engrg & Tech, Gazipur, Gazipur, Bangladesh, Bengir Ahmed Shuvho, Dhaka University of Engineering & Technology, Dhaka, Bangladesh, Uttam Kumar Debnath, Rajib Nandee, Dhaka University of Engineering and Technology, Gazipur, Gazipur, Bangladesh, Suman Das, University of Saskatchewan, Saskatchewan, SK, Canada, Md. Mir Sakib Ahmed, Dhaka University of Engineering and Technology, Gazipur, Gazipur, Select State/Province, Bangladesh*

**3:29pm**                    **Real (Out of This) World Education and Research: A Decade of Experience in Operating Professional Space Missions**

**Technical Presentation.** IMECE2018-89122

*Christopher Kitts, Santa Clara University, Santa Clara, CA, United States*

## 7-6 FLUID MECHANICS, HEAT TRANSFER, EXPERIMENTS AND ENERGY SYSTEMS

### 7-6-1 Fluid Mechanics, Heat Transfer, Experiments and Energy Systems

Third Floor, David L. Lawrence Convention Center, Room 316 4:00pm - 5:45pm

Session Chair: **Wael Mokhtar**, *Grand Valley State University, Grand Rapids, MI, United States*

**4:00pm Fabrication and Plumbing Works Using Pipe Fusion Thermal Technology: A Mechanical Engineering Extension Service for the Drug Dependents**

Technical Presentation. IMECE2018-89183

**Ronald Galindo**, *Cebu Technological University, Cebu City, Philippines*

**4:21pm An Experimental and Numerical Study on Airfoil Flow Characteristics: Evaluating the Problem Solving Skills of Students**

Technical Presentation. IMECE2018-89475

**Sanjivan Manoharan**, **Dylan DiGiovanni**, **Jordan O'Hearn**, *Grand Valley State University, Grand Rapids, MI, United States*

**4:42pm Macgyvering and Entrepreneurial Mindset Learning: Examples for the Thermodynamics Classroom**

Technical Presentation. IMECE2018-89579

**Natasha Vermaak**, *Lehigh University, Bethlehem, PA, United States*, **Yaozhong Zhang**, **Yanmei Sun**, *Lehigh Univ., Bethlehem, PA, United States*

**5:03pm Examples of Undergraduate Research Project in Thermodynamics: Generalized Correlations of Vapor Pressure and Enthalpy of Vaporization**

Technical Presentation. IMECE2018-89747

**Amir Karimi**, *U. of Texas-San Antonio, San Antonio, TX, United States*, **Joseph Stephen Fernandez**, *The University of Texas at San Antonio, Victoria, TX, United States*

## 7-7 PROBLEM SOLVING IN ENGINEERING EDUCATION, RESEARCH AND PRACTICE

### 7-7-2 Problem Solving in Engineering Education, Research and Practice- II

Third Floor, David L. Lawrence Convention Center, Room 315 4:00pm - 5:45pm

Session Chair: **Zbigniew Bzymek**, *University of Connecticut, Storrs, CT, United States*

**4:00pm Using Engineering Equation Solver (EES) to Solve Engineering Problems in Mechanical Engineering**

Technical Paper Publication. IMECE2018-86078

**Haifa El-Sadi**, *Wentworth Institute of Technology, Boston, MA, United States*

**4:21pm Problem Based Learning: Generating a 3D Educational Brain Model to Engage Undergraduate Engineering Honors Students**

Technical Paper Publication. IMECE2018-87197

**Connie Gomez**, **Sheema Nasir**, *San Jacinto College, Houston, TX, United States*

**4:42pm Hands-On Experiences for Problem Solving in Engineering Education Based on Trees and Plants**

Technical Paper Publication. IMECE2018-87583

**Gustavo Vargas-Silva**, *University of the Basque Country, San Sebastian, Gipuzkoa, Spain*, **Mariappan Jawaharlal**, *California State Polytechnic University, Pomona, Pomona, CA, United States*

**5:03pm Strategies to Address Design Thinking in Engineering Curriculum**

Technical Paper Publication. IMECE2018-87816

**Devdas Shetty**, *University of District of Columbia, Washington DC, DC, United States*, **Jiajun Xu**, *University of the District of Columbia, Washington, DC, United States*

## **Energy MONDAY, NOVEMBER, 12**

## 8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS

### 8-4-1 Advanced Power Cycles

Third Floor, David L. Lawrence Convention Center, Room 317 9:45am - 11:30am

Session Chair: **Khamid Mahkamov**, *Northumbria University, Newcastle upon Tyne, United Kingdom*

Session Co-Chair: **Roberto Carapellucci**, *University of L'Aquila, L'Aquila, IT, Italy*

**9:45am Power and Efficiency Optimizations for an Open Cycle Two-Shaft Gas Turbine Power Plant**

Technical Paper Publication. IMECE2018-86246

**Huijun Feng**, **Wanli Zhang**, *College of Power Engineering, Naval University of Engineering, Wuhan, China*, **Lingen Chen**, **Shaojun Xia**, *Naval University of Engineering, Wuhan, China*

**10:06am Novel Twin-Screw Stirling Cycle Machine for Cryogenic and Refrigeration Applications**

Technical Paper Publication. IMECE2018-86853

**Khamid Mahkamov**, **Irina Makhkamova**, **Fadi Kahwash**, *Northumbria University, Newcastle upon Tyne, United Kingdom*

**10:27am Thermal Design and Performance Prediction of a Shell Condenser for Closed-Cycle Underwater Vehicles**

Technical Paper Publication. IMECE2018-86999

**Peiyu Chen**, **Hongbin Yan**, **Gongnan Xie**, *Northwestern Polytechnical University, Xi'an, Select State/Province, China*, **Bengt Sunden**, *Lund University, Lund, Sweden*

**10:48am HEAT PUMP-ORGANIC RANKINE CYCLE (HP-ORC) INTEGRATED SYSTEMS FOR ENERGY STORAGE APPLICATIONS**

Technical Presentation. IMECE2018-87442

*Claudia Toro, University of Rome Sapienza DMA, Roma, Italy, Roberto Capata, Univer Of Rome, Roma, Italy, Enrico Sciubba, Univ Di Roma, Roma 00184, Italy*

**11:09am Thermodynamic Modeling of Allam Cycle**

Technical Paper Publication. IMECE2018-88079

*Najmus Saquib Sifat, Yousef Haseli, Central Michigan University, MT Pleasant, MI, United States*

**8-5 ENERGY SYSTEMS COMPONENTS**

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**8-5-1 Energy Systems Components - 1**

**Third Floor, David L. Lawrence Convention Center, Room 306 9:45am - 11:30am**

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Session Chair: **Roberto Capata, Univer Of Rome, Roma, Italy**

**9:45am On Numerical Investigation of Water Injection to Screw Compressors**

Technical Paper Publication. IMECE2018-86463

*Sham Rane, University of Oxford, Oxford, England, United Kingdom, Ahmed Kovacevic, City University of London, London, Select State/Province, United Kingdom, Nikola Stosic, City University London, London, United Kingdom, Graham Stuppel, Jaecklin GmbH, Augsburg, Bavaria, Germany*

**10:06am A Performance Comparison for Electric and Hydraulic Motors**

Technical Paper Publication. IMECE2018-86761

*Mohammed Al-Mudhafar, University of Missouri - Columbia, COLUMBIA, MO, United States, Noah Manning, University Of Missouri — Columbia, Columbia, MO, United States*

**10:27am Design and Analysis of the Self-Powered 2-Lobe and 3-Lobe Continuous Mud-Pulse Turbo Siren**

Technical Paper Publication. IMECE2018-87733

*Xiaobo Peng, Prairie View A&M University, Prairie View, TX, United States, Diwei Zhang, Prairie View A&M University, CYPRESS, TX, United States*

**10:48am A Reforming Characteristics of a Mid-Temperature Methane-Steam Reformer With Various Configurations**

Technical Paper Publication. IMECE2018-88260

*Kyungin Cho, Sangseok Yu, Jinwon Yun, Chungnam National University, Daejeon, Korea (Republic)*

**11:09am Translator Dynamics and Performance Comparison on One and Two Cylinder Free Piston Engines**

Technical Paper Publication. IMECE2018-88689

*Mehar Bade, West Virginia University, Morgantown, WV, United States, Nigel Clark, Parviz Famouri, West Virginia Univ, Morgantown, WV, United States, PriyaankaDevi Guggilapu, West Virginia University, Morgantown, WV, United States*

**8-6 LOW-TEMPERATURE ENERGY CONVERSION SYSTEMS**

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**8-6-1 Low-Temperature Energy Conversion Systems**

**Third Floor, David L. Lawrence Convention Center, Room 319 9:45am - 11:30am**

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Session Chair: **Andrea Lazzaretto, University of Padua, Italy, Padova 35122, Italy**

**9:45am Preliminary Design of a Lab-Scale Organic Rankine Cycle for Waste Heat Recovery Applications**

Technical Paper Publication. IMECE2018-86434

*Carlos Cabezas, José Mendoza, Iván Ponce, Rafael Cantorin, Daniel Gonzales, Jessica Estrella, Sergio Peralta, Cesar Celis, Pontificia Universidad Católica del Perú, Lima, Select State/Province, Peru*

**10:06am Comparative Exergy-Based Analysis of the LNG Regasification Integrated into Air Separation Units with External or Internal Compression Process**

Technical Presentation. IMECE2018-87551

*Tatiana Morosuk, Technical University Berlin, Berlin, Germany, Stefanie Tesch, TU Berlin, Berlin, Germany, George Tsatsaronis, Technical Univ Of Berlin, Berlin 10587, Germany*

**10:27am Exergy-based and Economic Evaluation of Cryogenics-based Energy Storage**

Technical Presentation. IMECE2018-87572

*Tatiana Morosuk, Technical University Berlin, Berlin, Germany, Sarah Hanjaly, TU Berlin, Berlin, Germany, George Tsatsaronis, Technical Univ Of Berlin, Berlin 10587, Germany*

**10:48am Low-Temperature Thermal Energy Harvesting Using Solid/Liquid Phase Change Materials**

Technical Paper Publication. IMECE2018-87956

*Guangyao Wang, Dong Sam Ha, Kevin G. Wang, Virginia Tech, Blacksburg, VA, United States*

**11:09am Design and Optimization of Flow Thermo-electrochemical Cell to Harvest Low Temperature Waste Heat**

Technical Presentation. IMECE2018-89546

*Ali Hussain Kazim, Aqib Javaid, Asif Mutahir, Muhammad Faraz, University of Engineering and Technology, Lahore, Lahore, Punjab, Pakistan*

**8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE**

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**8-11-1 Lithium Ion Batteries - Design and Performance**

**Third Floor, David L. Lawrence Convention Center, Room 318 9:45am - 11:30am**

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Session Chair: **Soumik Banerjee, Washington State University, Pullman, WA, United States**

Session Co-Chair: **George Nelson, University of Alabama in Huntsville, Huntsville, AL, United States**

**9:45am Discovery and Development of a Fast Charging Li-Ion Battery**

Technical Paper Publication. IMECE2018-87661

*Teng Liu, Xiao-Guang Yang, Pennsylvania State University, State College, PA, United States, Chao-Yang Wang, Pennsylvania State University, University Park, PA, United States*

**10:06am Predicting Second-Life Aging in Lithium-Ion Batteries Repurposed from Electric Vehicles Battery Packs**

Technical Presentation. IMECE2018-88842

*Daniela Galatro, Carlos Da Silva, Olivier Trescases, Zhe Gong, Cristina H. Amon, University of Toronto, Toronto, ON, Canada*

**10:27am A Comprehensive Review of Deformation Induced Short Circuit (ISC) in Li-ion Batteries**

Technical Presentation. IMECE2018-88952

*Golam Newaz, Wayne State University, Ann Arbor, MI, United States, Leela Mohana Reddy Arava, Wayne State Univeristy, Farmington Hills, MI, United States, Sanket Mundhe, Wayne State Univeristy, Detroit, MI, United States, Min Zhu, Omar Faruque, Ford Motor Company, Dearborn, MI, United States, James Cheng, Ford Motor Co, Dearborn, MI, United States, Saeed Barbat, Ford Motor Company, Dearborn, MI, United States*

**10:48am Characterization of Transport Parameters in NMC Cathode Phases using X-ray Microtomography Data**

Technical Presentation. IMECE2018-88285

*Thushananth Rajendra, University of Alabama in Huntsville, Huntsville, AL, United States, Aashish Mishra, Purdue University, West Lafayette, IN, United States, Jialing Xia, Argonne National Laboratory, Lemont, IL, United States, Partha Mukherjee, Purdue University, West Lafayette, IN, United States, George Nelson, University of Alabama in Huntsville, Huntsville, AL, United States*

**11:09am Measurement of mechanical properties and assessment of mechanical degradation of solid electrolyte interphase (SEI) formed with carbonate-based electrolytes.**

Technical Presentation. IMECE2018-89471

*Insun Yoon, Pradeep Guduru, Brown University, Providence, RI, United States*

**8-15 CMS-BIOFUEL PRODUCTION, GASIFICATION, AND COMBUSTION**

**8-15-1 CMS-Biofuel Systems and Processes**

**Third Floor, David L. Lawrence Convention Center, Room 316 9:45am - 11:30am**

Session Chair: *Yunye Shi, St. Ambrose University, Davenport, IA, United States*

Session Co-Chair: *Seyed Allameh, Northern Kentucky Univ, Newport, KY, United States*

**9:45am Modeling Woody Biomass Torrefaction Process**

Technical Paper Publication. IMECE2018-87974

*Mahmudul Hasan, Yousef Haseli, Central Michigan University, MT Pleasant, MI, United States*

**10:06am Experimental and Simulation Studies of Corn Kernel Gasification in a Double Air Stage Down-draft Reactor**

Technical Paper Publication. IMECE2018-88010

*Yunye Shi, St. Ambrose University, Davenport, IA, United States, Diego M. Yepes Maya, Regis Nascimento, Federal University of Itajuba, Itajuba, MG, Brazil, Tejasvi Sharma, University of Iowa, Iowa City, IA, United States, Albert Ratner, Univ Of Iowa, Iowa City, IA, United States, Electo E. Silva Lora, Federal University of Itajuba, Itajuba, MG, Brazil*

**10:27am Physical (Steam) Activation of Post-Gasification Biochar Derived From Peach Pits**

Technical Paper Publication. IMECE2018-88386

*Andres Munoz-Hernandez, Sina Dehghan, University of California - Merced, Merced, CA, United States, Gerardo Diaz, Univ Of California Merced, Merced, CA, United States*

**10:48am Design, Flame Analysis and Performance Evaluation of a Laboratory Scale Bio Lantern fueled using Cow-Tallow bio-diesel**

Technical Presentation. IMECE2018-88991

*Onyemazuwa A., Azaka, Emmanuel, C Nwadike, NNAMDI AZIKIWE UNIVERSITY, AWKA, Anambra State/South-Eastern Nigerian, Nigeria*

**11:09am Design and construction of a laboratory scale lantern for bio fuel bio-diesel combustion and flame structure analysis**

Technical Presentation. IMECE2018-88992

*Emmanuel, C Nwadike, Onyemazuwa A., Azaka, Nnamdi Azikiwe University, Awka, Southeastern Nigeria, Nigeria*

**8-2 FUNDAMENTALS AND APPLICATIONS OF THERMODYNAMICS**

**8-2-1 Energy and Exergy analysis of power cycles**

**Third Floor, David L. Lawrence Convention Center, Room 306 1:45pm - 3:30pm**

Session Chair: *Michael Nitsas, National Technical University of Athens, Zografou, Select State/Province, Greece*

**1:45pm Modeling and Performance Analysis of a Dual-Shaft Counter-Rotating Gas Turbine**

Technical Paper Publication. IMECE2018-86146

*Qiao Zhou, University of Chinese Academy of Sciences, Beijing, China, Zhao Yin, Chunqing Tan, Qing Gao, Yongsheng Tian, Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China*

**2:06pm**      **Triaxial Gas Turbine Performance Analysis for Variable Power Turbine Inlet Guide Vane Control Law Optimization**

**Technical Paper Publication.** IMECE2018-86161

*Tao Wang, University of Chinese Academy of Sciences, Beijing, China, Yongsheng Tian, Zhao Yin, Qing Gao, Chunqing Tan, Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China*

**2:27pm**      **Performance Comparison and Parametric Analysis of sCO<sub>2</sub> Power Cycles Configurations**

**Technical Paper Publication.** IMECE2018-86843

*Ali Alsagri, University of Dayton, Beavercreek, OH, United States, Andrew Chiasson, University of Dayton, Dayton, OH, United States, Ahmad/ A Aljabr, University of Dayton, Dayton, OH, United States*

**2:48pm**      **Thermo-Economic Analysis of an Integrated Supercritical CO<sub>2</sub> Brayton Cycle and Multiple Effect Desalination Systems**

**Technical Paper Publication.** IMECE2018-88409

*Sattam Alharbi, University of Central Florida, Orlando, FL, United States, Mohamed L. Elsayed, Louis Chow, University of Central Florida, ORLANDO, FL, United States*

**3:09pm**      **Exergy and Energy Analysis of a Combined Power Cycle**

**Technical Presentation.** IMECE2018-88917

*Almandhar AlNaamani, Sultan Qaboos University, Muscat, Muscat, Oman, Nabeel AlRawahi, Sultan Qaboos University, Al Khoud, Muscat, Oman*

## **8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS**

**8-4-2 Improvement in performance and emissions of energy systems**

**Third Floor, David L. Lawrence Convention Center, Room 317      1:45pm - 3:30pm**

Session Chair: **Gregory Kowalski, Northeastern University, Boston, MA, United States**

Session Co-Chair: **Roberto Carapellucci, University of L'Aquila, L'Aquila, IT, Italy**

**1:45pm**      **Thermodynamic Performance Study of the SOFC-GT-RC System Fueled by LNG With Zero-CO<sub>2</sub>-Emission**

**Technical Paper Publication.** IMECE2018-86115

*Xiaoyu Yang, College of Machinery and Transportation Engineering China University of Petroleum Beijing, China, Beijing, China, Hongbin Zhao, China University of Petroleum, Beijing, Beijing, China*

**2:06pm**      **MCFC-Based System for Active CO<sub>2</sub> Capture From Flue Gases**

**Technical Paper Publication.** IMECE2018-86881

*Roberto Carapellucci, University of L'Aquila, L'Aquila, IT, Italy, Roberto Cipollone, Univ Of L'aquila, L'Aquila, Italy, Davide Di Battista, University of L'Aquila, L'Aquila, Italy*

**2:27pm**      **Methanol Production from Coal ? Performance and Exergy Analysis of Synthesis Routes with an Entrained and a Moving Bed Gasifier**

**Technical Presentation.** IMECE2018-87560

*Tatiana Morosuk, Technical University Berlin, Berlin, Germany, Timo Blumberg, TU Berlin, Berlin, Germany, George Tsatsaronis, Technical Univ Of Berlin, Berlin 10587, Germany*

**2:48pm**      **Energy and Exergy Analysis of a Biomass Based Ceramic Plant**

**Technical Paper Publication.** IMECE2018-88046

*Diogo Esteves, University of Minho, Guimarães, Select State/Province, Portugal, Cândida Vilarinho, Mechanical Engng Department University of Minho, Guimarães, Select State/Province, Portugal, Manuel Eduardo Ferreira, University Of Minho, Guimaraes, Portugal, Joana Carvalho, Mechanical Engng Department University of Minho, Guimarães, OO, Portugal, Jorge Araújo, CVR - Centro para a Valorização de Resíduos, Guimarães, Portugal, Jose Teixeira, University of Minho, Guimaraes, Portugal*

**3:09pm**      **Effect of Thermal Storage on the Performance of Residential Scale Hybrid Tri-Generation System**

**Technical Presentation.** IMECE2018-88213

*Varun Gaur, Vaibhav Sahdev, Northeastern University, Boston, MA, United States, Mansour Zenouzi, Wentworth Inst Of Tech, Boston, MA, United States, Gregory Kowalski, Northeastern University, Boston, MA, United States*

## **8-10 RENEWABLE ENERGY**

**8-10.1 Advanced Technologies for Wind Energy**

**Third Floor, David L. Lawrence Convention Center, Room 317      1:45pm - 3:30pm**

Session Chair: **Christopher Depcik, University of Kansas, Lawrence, KS, United States**

Session Co-Chair: **Navid Goudarzi, UNCC, Charlotte, NC, United States**

**1:45pm**      **Large-Eddy Simulation of Offshore Wind Farms for Power Prediction**

**Technical Paper Publication.** IMECE2018-87965

*Micah Sandusky, Boise State University, Boise, ID, United States, Rey DeLeon, University of Idaho, Moscow, ID, United States, Inanc Senocak, University of Pittsburgh, Pittsburgh, PA, United States*

**2:06pm**      **Variable Twist Blade Transformation to Improve Wind Turbine Performance**

**Technical Paper Publication.** IMECE2018-88433

*Hamid Khakpour Nejadkhaki, University at Buffalo, State University, Buffalo, NY, United States, John Hall, University At Buffalo, Buffalo, NY, United States*

**2:27pm**      **Wind Farm Micrositing Layout Optimization Using Stackelberg Game Theory Approach**

**Technical Presentation.** IMECE2018-88978

*Ramin Farajifijani, Alfred University, Alfred, NY, United States, saeed ahmadian, University of Houston, Houston, TX, United States, Ehsan Ghotbi, Alfred University, Alfred, NY, United States*

**2:48pm NUMERICAL INVESTIGATION AND OPTIMIZATION OF CONVENTIONAL VAWT IN COMBINATION WITH CONVERGENT NOZZLE**

Technical Presentation. IMECE2018-88765

*Mst Sunzida Ferdoues, Krishna Vijayaraghavan, Simon Fraser University, North York, ON, Canada*

**3:09pm Mini Wind Turbine for Small Scale Power Generation and Storage (Archimedes Wind Turbine Model)**

Technical Paper Publication. IMECE2018-88455

*Michael Ozeh, Ashreet Mishra, Xiuling Wang, Purdue University Northwest, Hammond, IN, United States*

**8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE**

**8-11-2 Modeling Efforts in Batteries**

**Third Floor, David L. Lawrence Convention Center, Room 316 1:45pm - 3:30pm**

Session Chair: **Soumik Banerjee**, Washington State University, Pullman, WA, United States

Session Co-Chair: **Partha Mukherjee**, Purdue University, West Lafayette, IN, United States

**1:45pm Machine Learning Based Understanding Of Lithium-ion Battery Performance Decay**

Technical Presentation. IMECE2018-87162

*Ankit Verma, Purdue University, Lafayette, IN, United States, Partha Mukherjee, Purdue University, West Lafayette, IN, United States*

**2:06pm Sodium ion transport in sodium thiophosphate glasses: An ab initio molecular dynamics study**

Technical Presentation. IMECE2018-88224

*Aniruddha Dive, Scott Beckman, Soumik Banerjee, Washington State University, Pullman, WA, United States*

**2:27pm A Computer Experiment Based Real Time Simulation Model for A Spirally-Wounded Lithium-Ion Cell**

Technical Presentation. IMECE2018-88509

*Chao Li, Rutgers University, Piscataway, NJ, United States, Asimina Pelegri, Rutgers University, East Brunswick, NJ, United States*

**2:48pm Machine Learning Analysis of Degradation ? Safety Interaction in Li-ion Cells**

Technical Presentation. IMECE2018-87819

*Daniel Juarez-Robles, Partha Mukherjee, Purdue University, West Lafayette, IN, United States, Judith Jeevarajan, Underwriters Laboratories Inc., Northbrook, IL, United States*

**3:09pm Reactive force field based molecular dynamics simulations to investigate sodium ion transport in glassy electrolytes**

Technical Presentation. IMECE2018-88207

*Aniruddha Dive, Scott Beckman, Soumik Banerjee, Washington State University, Pullman, WA, United States*

**8-16 CMS-BIOFUELS PRODUCTION, CONVERSION, AND SIMULATION**

**8-16-1 CMS-Biofuels Production, Conversion, and Simulation**

**Third Floor, David L. Lawrence Convention Center, Room 316 1:45pm - 3:30pm**

Session Chair: **Albert Ratner**, Univ Of Iowa, Iowa City, IA, United States

Session Co-Chair: **Seyed Allameh**, Northern Kentucky Univ, Newport, KY, United States

**1:45pm A Life Cycle Assessment of Biofuel Produced From Waste Cooking Oil**

Technical Paper Publication. IMECE2018-86301

*Sierra Spencer, Malia Scott, Nelson Macken, Swarthmore College, Swarthmore, PA, United States*

**2:06pm Understanding the Effect of Oxygenated Biofuels Addition on Combustion Characteristics of Gasoline**

Technical Paper Publication. IMECE2018-86490

*Shrabanti Roy, Mississippi State University, Starkville, MS, United States, Saeid Zare, Omid Askari, Mississippi State University, Mississippi State, MS, United States*

**2:27pm "The Development of a Simple Alternative Hybrid Engine for Gasoline, LPG and Biogas"**

Technical Paper Publication. IMECE2018-86552

*Anchasa Pramuanjaroenkij, Amarin Tongkratoke, Siriluk Prankhongsong, Kasetsart University, Chalermphrakiat Sakon Nakhon Province Campus, Sakon Nakhon, Sakon Nakhon, Thailand, Sadik Kakac, ToBB Univ Of Economics And Tech, Ankara 06560, Turkey*

**2:48pm Effect Of Diethyl Ether On The Performance And Emission Characteristics Of Diesel ? Rice Bran Methyl Ester ? Biogas Fueled Dual Fuel Diesel Engine**

Technical Presentation. IMECE2018-89362

*SK Mahla, IKG Punjab Technical University, Hoshiarpur, India, Haeng Muk Cho, Kongju National University, South Korea, Cheonan, Korea (Republic), Bhupendra Singh Cahauhan, Lovely Professional University, Phagwara, Punjab, India*

**8-1 ENERGY-RELATED MULTIDISCIPLINARY**

**8-1-1 Energy-Related Multidisciplinary - 1**

**Third Floor, David L. Lawrence Convention Center, Room 316 3:45pm - 5:30pm**

Session Chair: **Mahmoud Elsharafi**, Midwestern State University, Wichita Falls, TX, United States

Session Co-Chair: **Claudia Toro**, University of Rome Sapienza DMA, Roma, Italy

**3:45pm Deep Decarbonization of Total Global Energy: Hydrogen and Ammonia C-free Fuels vs. Electricity as Integrated CO2-emission-free Energy Systems**

Technical Presentation. IMECE2018-86186

*William Leighty, The Leighty Foundation, Juneau, AK, United States*

**4:06pm** Experimental Study of the Sustainability of a Renewable-Energy-Driven Residential System With Heating Loads

Technical Paper Publication. IMECE2018-86242

*Takao Kakizaki, Kosuke Hirano, Norio Morohashi, Masahito Oguma, Nihon University, Koriyama, Fukushima, Japan*

**4:27pm** Wet Gas Compressor Operation and Performance

Technical Paper Publication. IMECE2018-86562

*Martin Bakken, Tor Bjorge, Norwegian university of science and technology (NTNU), Trondheim, Select State/Province, Norway, Lars Eirik Bakken, Norwegian Univ Of Sci & Tech, Trondheim, Select State/Province, Norway*

**4:48pm** Energy Mix Forecasting in Abu Dhabi Using Mixed Integer Linear Program

Technical Paper Publication. IMECE2018-87575

*Moza Al Naimi, Khalifa University of Science and Technology, Masdar Institute, Abu Dhabi, United Arab Emir., Mohamed Ali, Khalifa University of Science and Technology, Masdar City, Abu Dhabi, United Arab Emir., Gento Mogi, University of Tokyo, Tokyo, Japan*

**5:09pm** Energy efficient metal mesh fog filters to simultaneously harness atmospheric fog-water and remove VOCs

Technical Presentation. IMECE2018-89731

*Ritwick Ghosh, Rakesh Sahu, Igor Zhitomirsky, McMaster University, Hamilton, ON, Canada, Ranjan Ganguly, Jadavpur University, Kolkata, WEST BENGAL, India, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

**8-2 FUNDAMENTALS AND APPLICATIONS OF THERMODYNAMICS**

**8-2-2 Thermodynamics of cooling and thermal processes**

**Third Floor, David L. Lawrence Convention Center, Room 315 3:45pm - 5:30pm**

Session Chair: *Michael Nitsas, National Technical University of Athens, Zografou, Select State/Province, Greece*

**3:45pm** Thermo-economic Analysis of a Solar MVC Desalination System

Technical Paper Publication. IMECE2018-86212

*Lei Gao, Gyeong Sung Kim, University of Maryland, College Park, MD, United States, Yunho Hwang, Univ Of Maryland, College Park, MD, United States*

**4:06pm** A Comparative Study of Solar-Driven Absorption Refrigeration Cycles- Effect of the Utilized Working Pair

Technical Presentation. IMECE2018-86864

*Michael Nitsas, National Technical University of Athens, Zografou, Select State/Province, Greece, Irene Koronaki, NTUA, Zografou, Select State/Province, Greece*

**4:27pm** Thermal Analysis of Phase Change Materials by Utilizing Nanoparticles

Technical Paper Publication. IMECE2018-87026

*Michael Nitsas, National Technical University of Athens, Zografou, Select State/Province, Greece, Irene Koronaki, NTUA, Zografou, Select State/Province, Greece, Athanasios Beliotis, National Technical University of Athens, Athens, Greece*

**4:48pm** First and Second Law Analysis of a Flat Plate Collector Working With Nanofluids

Technical Paper Publication. IMECE2018-87782

*Michael Nitsas, National Technical University of Athens, Zografou, Select State/Province, Greece, Irene Koronaki, NTUA, Zografou, Select State/Province, Greece, Loukia Prentza, National Technical University of Athens, Athens, Greece*

**5:09pm** Experimental Investigation of Ejector Refrigeration System With Double Condensers

Technical Paper Publication. IMECE2018-88671

*H.H. Sait, King Abdulaziz University, Rabigh, Makkah, Saudi Arabia, B.A. Habibullah, King Abdulaziz University, Jeddah, Saudi Arabia, Nadim Turkman, KAU, Jeddah, Saudi Arabia, Hongbin Ma, University Of Missouri, Columbia, MO, United States*

**8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS**

**8-4-3 Solar/Waste-Heat Power Generation**

**Third Floor, David L. Lawrence Convention Center, Room 317 3:45pm - 5:30pm**

Session Chair: *Tatiana Morosuk, Technical University Berlin, Berlin, Germany*

Session Co-Chair: *Roberto Carapellucci, University of L'Aquila, L'Aquila, IT, Italy*

**3:45pm** Thermodynamic Performance Study on Solar-Assisted SOFC - GT Distributed Energy System Fueled by Methanol

Technical Paper Publication. IMECE2018-86114

*Qinlong Hou, College of Machinery and Transportation Engineering China University of Petroleum Beijing, China, Beijing, China, Hongbin Zhao, China University of Petroleum, Beijing, Beijing, China*

**4:06pm** Supercritical CO<sub>2</sub> Cycle Combined with Concentrated Solar Tower Technology

Technical Presentation. IMECE2018-87578

*Tatiana Morosuk, Technical University Berlin, Berlin, Germany, Mohamed Noaman, TU Berlin, Berlin, Germany, George Tsatsaronis, Technical Univ Of Berlin, Berlin 10587, Germany*

**4:27pm** Exergy-based Evaluation of a Waste-heat Driven Tri-generation System with CO<sub>2</sub> as Working Fluid

Technical Presentation. IMECE2018-87584

*Tatiana Morosuk, Technical University Berlin, Berlin, Germany, Jing Luo, TU Berlin, Berlin, Germany, George Tsatsaronis, Technical Univ Of Berlin, Berlin 10587, Germany*

**Draft Program**

**4:48pm**      **Retrofitting Gas Turbine Units Parabolic Trough Concentrated Solar Power for Sustainable Electricity Generation**

Technical Paper Publication. IMECE2018-87673

*Mohamed Ali, Wael Alnahdi, Sara Al Shamsi, Wafaa Alantali, Shaikha Al Shehhi, Khalifa University of Science and Technology, Masdar City, Abu Dhabi, United Arab Emir.*

**5:09pm**      **Development and Investigation of a Solar-Biogas Hybrid Brayton Cycle for 100 kW Power Generation**  
Technical Paper Publication. IMECE2018-87678

*Saad Alshahrani, Abraham Engeda, Michigan State University, East Lansing, MI, United States*

## **8-5 ENERGY SYSTEMS COMPONENTS**

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### **8-5-2 Energy Systems Components - 2**

**Third Floor, David L. Lawrence Convention Center, Room 306      3:45pm - 5:30pm**

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Session Chair: **Roberto Capata**, *Univer Of Rome, Roma, Italy*

**3:45pm**      **Design and Testing of a Micro-Bubble Separation System**

Technical Paper Publication. IMECE2018-86104

*Jordan Farina, Christopher Manderson, Phillip Tran, Heather Dillon, University of Portland, Portland, OR, United States*

**4:06pm**      **Experimental Study of a Robust Foil Regenerator in the Oscillating Flow**

Technical Paper Publication. IMECE2018-86702

*Koji Yanaga, Songgang Qi, Payal Yadav, West Virginia University, Morgantown, WV, United States*

**4:27pm**      **Effect of Geometric Configuration and Back Plate Addition in Minichannel Solar Collectors**

Technical Paper Publication. IMECE2018-87852

*Julio Perez, Sai Kiran Hota, University of California - Merced, Merced, CA, United States, Gerardo Diaz, Univ Of California Merced, Merced, CA, United States*

**4:48pm**      **A Study of Water Transport of Hollow Fiber Membranes Over Various Operating Conditions**

Technical Paper Publication. IMECE2018-88067

*Jongmin Chae, Sangseok Yu, Chungnam National University, Daejeon, Korea (Republic)*

**5:09pm**      **Structural Analysis of Ground Mounted Solar Panel Array**

Technical Paper Publication. IMECE2018-88526

*ASHHAR TUFAIL MOHAMMMAD, Barun Pratiher, Indian Institute of Technology Jodhpur, Jodhpur, RAJASTHAN, India*

## **8-10 RENEWABLE ENERGY**

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### **8-10-2 Advanced Technologies for Solar Energy**

**Third Floor, David L. Lawrence Convention Center, Room 319      3:45pm - 5:30pm**

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Session Chair: **Christopher Depcik**, *University of Kansas, Lawrence, KS, United States*

Session Co-Chair: **Navid Goudarzi**, *UNCC, Charlotte, NC, United States*

**3:45pm**      **Thermal Modeling of Concentrated Photovoltaic Thermal System at Different Operating Conditions**

Technical Paper Publication. IMECE2018-86899

*Shah Alam, Texas A&M University-Kingsville, Kingsville, TX, United States, Rahul C. Yelamanchili, Texas A&M University - Kingsville, Kingsville, TX, United States*

**4:06pm**      **Harnessing of Solar Energy with and without Tracking**

Technical Presentation. IMECE2018-89922

*Mehmet Sozen, Grand Valley State University, Grand Rapids, MI, United States, Md Nahid Pervez, Ford Motor Company, Palo Alto, CA, United States*

**4:27pm**      **Optimization of Nano-Texture Parameters of CdTe/CdS Thin Film Solar Cells**

Technical Paper Publication. IMECE2018-86858

*Joshua Smay, Penn State- Harrisburg, Middletown, PA, United States, Ola Rashwan, Penn State University, Middletown, PA, United States, James Thomas, Penn State- Harrisburg, Middletown, PA, United States*

**4:48pm**      **Solar Photovoltaic Power Plant Development for a Desert Climate**

Technical Paper Publication. IMECE2018-86588

*Abdullah Alanezi, Mohammad Naraghi, Manhattan College, Bronx, NY, United States*

**5:09pm**      **Photovoltaic Solar Energy: Potentials and Outlooks**

Technical Paper Publication. IMECE2018-86991

*Williams S. Ebhota, University of Johannesburg, Johannesburg, South Africa, Tien-Chien Jen, Univ Of Johannesburg, Johannesburg, South Africa*

## **8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE**

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### **8-11-3 Structural Analysis of Li-ion Batteries**

**Third Floor, David L. Lawrence Convention Center, Room 318      3:45pm - 5:30pm**

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Session Chair: **George Nelson**, *University of Alabama in Huntsville, Huntsville, AL, United States*

**3:45pm** In situ Measurement of Plane Strain Modulus of the Solid Electrolyte Interphase (SEI) on Lithium Metal Anodes in Ionic Liquid Electrolytes  
Technical Presentation. IMECE2018-89473  
*Insun Yoon, Pradeep Guduru, Brown University, Providence, RI, United States*

**4:06pm** Tuning Electrode Structure to Improve the Rate Capability of Energy Dense Lithium Ion Batteries  
Technical Presentation. IMECE2018-89998  
*Prehit Patel, Thushananth Rajendra, George Nelson, University of Alabama in Huntsville, Huntsville, AL, United States*

**4:27pm** Local Strain Assessment in Li-ion Battery Layers Subjected to External Deformation  
Technical Presentation. IMECE2018-88962  
*Golam Newaz, Wayne State University, Ann Arbor, MI, United States, Leela Mohana Reddy Arava, Wayne State University, Farmington Hills, MI, United States, Sanket Mundhe, Wayne State University, Detroit, MI, United States, Min Zhu, Omar Faruque, Ford Motor Company, Dearborn, MI, United States, James Cheng, Ford Motor Co, Dearborn, MI, United States, Saeed Barbat, Ford Motor Company, Dearborn, MI, United States*

**4:48pm** Real-Time Measurement of Phase Transformation in Electrode Materials by Integrating In Situ Picosecond Ultrasonics and Atomic Force Microscopy  
Technical Presentation. IMECE2018-89477  
*Shaghayegh Rezazadeh Kalehbasti, LiWei Liu, Humphrey Maris, Pradeep Guduru, Brown University, Providence, RI, United States*

**5:09pm** Effect of Stress on the Diffusivity in Ge Electrode  
Technical Presentation. IMECE2018-89295  
*Siva P.V Nadimpalli, Rajasekhar Tripuraneni, Subhagit Rakshit, New Jersey Institute of Technology, Newark, NJ, United States*

## TUESDAY, NOVEMBER, 13

### 8-17 ENERGY PLENARY

#### 8-17-1 Energy Plenary

Third Floor, David L. Lawrence Convention Center,  
Room 302 8:00am - 8:45am

**8:00am** Thoughts on the Future of Power Generation: A Low Carbon Perspective  
Plenary Presentation. IMECE2018-90099  
*Ahmed Ghoniem, Massachusetts Inst Of Technology, Cambridge, MA, United States*

### 8-1 ENERGY-RELATED MULTIDISCIPLINARY

#### 8-1-2 Energy-Related Multidisciplinary - 2

Third Floor, David L. Lawrence Convention Center,  
Room 315 10:00am - 11:45am

Session Chair: **Claudia Toro**, *University of Rome Sapienza DMA, Roma, Italy*  
Session Co-Chair: **Mahmoud Elsharafi**, *Midwestern State University, Wichita Falls, TX, United States*

**10:00am** Measurements of the Contact Angles for Various Fluids Which Are Widely Used in the Oilfields to Improve Oil Recovery  
Technical Paper Publication. IMECE2018-86717  
*Mahmoud Elsharafi, kelton vidal, rumelia thomas, Midwestern State University, Wichita Falls, TX, United States*

**10:21am** On-Board State of Health Estimation of Lithium Ion Batteries With Incremental Capacity Analysis Based on Gaussian Function  
Technical Paper Publication. IMECE2018-86902  
*Tongyi Liang, Lingjun Song, Beihang university, Beijing, China*

**10:42am** Effect of Nonlinear Characteristic of the Gas Turbine Engine Fuel System With Hardware-in-the-Loop  
Technical Paper Publication. IMECE2018-86922  
*Jinwei Chen, Jingxuan Li, Shengnan Sun, Shanghai Jiao Tong University, Shanghai, China, Huisheng Zhang, Shanghai Jiao Tong Univ, Shanghai, China*

**11:00am** High Voltage Plasma Reactor for Treatment of Carbon Dioxide and Oxygen Generation  
Technical Paper Publication. IMECE2018-87610  
*Kamau Wright, University of Hartford, West Hartford, CT, United States*

**11:24am** Mechanical Testing and Modeling of the Graphite Anode of Lithium-ion Batteries  
Technical Presentation. IMECE2018-89468  
*Wei Li, Tsinghua University, Beijing, Beijing, China, Juner Zhu, Massachusetts Institute of Technology, Cambridge, MA, United States, Xia Yong, Tsinghua university, Beijing, Beijing, China, Elham Sahraei Esfahani, George Mason University, Fairfax, VA, United States*

### 8-2 FUNDAMENTALS AND APPLICATIONS OF THERMODYNAMICS

#### 8-2-3 Chemical Thermodynamic processes

Room 311 10:00am - 11:45am

Session Chair: **George Tsatsaronis**, *Technical Univ Of Berlin, Berlin 10587, Germany*  
Session Co-Chair: **Michael Nitsas**, *National Technical University of Athens, Zografou, Select State/Province, Greece*

**10:00am Ecological Performance of a Generalized Radiative System Light-Driven Engine (LDE) With [A]f [B] Reacting System Improved by Controlling Piston Motion**  
Technical Paper Publication. IMECE2018-86252  
*Huijun Feng, Kang Ma, College of Power Engineering, Naval University of Engineering, Wuhan, China, Lingen Chen, Shaojun Xia, Naval University of Engineering, Wuhan, China*

**10:21am Avoidable and Unavoidable Exergetic Destruction Analysis of a Nitric Acid Production Plant**  
Technical Paper Publication. IMECE2018-87495  
*Juan Fajardo, Universidad Tecnológica De Bolívar, Cartagena, OO, Colombia, Harold Valle, University of Puerto Rico, Cartagena, Cartagena, Colombia, Ana Buelvas, Universidad Tecnológica de Bolívar, Catagena De Indias, Bolivar, Colombia*

**10:42am Advances in Combustion Irreversibility Analysis by Using a Heuristic Finite Increment Method**  
Technical Presentation. IMECE2018-89270  
*YUEJUN YAN, University of Pennsylvania, Philadelphia, PA, United States, Noam Lior, Univ Of Pennsylvania, Philadelphia, PA, United States*

**11:03am INFLUENCE OF ADVANCED INJECTION TIMING ON EXERGY ANALYSIS OF DI DIESEL ENGINE FUELLED WITH WASTE COOKING OIL BIODIESEL**  
Technical Presentation. IMECE2018-89534  
*Veena Chaudhary, INDIAN INST OF TECH ROORKEE, ROORKEE, UTTRAKHAND, India*

**11:24am Extending Degree of Disequilibrium Analysis for Automatic Selection of Kinetic Constraints in the Rate-Controlled Constrained Equilibrium method**  
Technical Paper Publication. IMECE2018-88809  
*Fatemeh Hadi, Tennessee State University, Nashville, TN, United States, Vreg Yousefian, Tennessee State University, Carlisle, MA, United States, Ehsan Sarfaraz, Tennessee State University, Nashville, TN, United States, Gian Paolo Beretta, Università Di Brescia, Brescia, Italy*

## **8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS**

### **8-4-4 Engines Behaviour and Fuel Characteristics**

**Third Floor, David L. Lawrence Convention Center, Room 316 10:00am - 11:45am**

Session Chair: **Qun Chen, Tsinghua University, Beijing, OO, China**  
Session Co-Chair: **Roberto Carapellucci, University of L'Aquila, L'Aquila, IT, Italy**

**10:00am Development of Test Rigs to Investigate Fluid Flow and Heat Transfer in a Stirling Engine Heater Head**  
Technical Paper Publication. IMECE2018-86378  
*Pawan Yadav, Songgang Qiu, Koji Yanaga, West Virginia University, Morgantown, WV, United States*

**10:21am Power Flow Topology of Supercritical Carbon Dioxide Power Generation System and its Application in Modeling and Optimization**  
Technical Paper Publication. IMECE2018-87272  
*Qun Chen, Xia Li, Xi Chen, Tsinghua University, Beijing, OO, China*

**10:42am Improvement in Thermal Efficiency of a Fuel Reforming Engine System Using Low Concentration Hydrous Ethanol**  
Technical Presentation. IMECE2018-87402  
*Yuzo Shirakawa, Atsushi Shiamda, Takao Ishikawa, Hitachi, Ltd, Ibaraki, Japan, Toshio Shudo, Tokyo Metropolitan University, Tokyo, Japan*

**11:03am Lean-Burn Characteristics of a Heavy-Duty Diesel Engine Retrofitted to Natural Gas Spark Ignition**  
Technical Paper Publication. IMECE2018-87761  
*Jinlong Liu, Cosmin Dumitrescu, West Virginia University, Morgantown, WV, United States*

**11:24am Effect of Piston Crevices on 3D Simulation of a Heavy-Duty Diesel Engine Retrofitted to Natural Gas Spark Ignition**  
Technical Paper Publication. IMECE2018-87783  
*Iolanda Stocchi, University of Perugia, Morgantown, WV, United States, Jinlong Liu, Cosmin Dumitrescu, West Virginia University, Morgantown, WV, United States, Michele Battistoni, University of Perugia, Perugia, Italy, Carlo N. Grimaldi, Università degli Studi di Perugia, Perugia, Italy*

## **8-10 RENEWABLE ENERGY**

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### **8-10-3 Advanced Technologies for Ocean Energy**

**Third Floor, David L. Lawrence Convention Center, Room 318 10:00am - 11:45am**

Session Chair: **Navid Goudarzi, UNCC, Charlotte, NC, United States**

**10:00am Gyroscopic Wave Energy Generator for Fish Farms and Rigs**  
Technical Paper Publication. IMECE2018-86188  
*Alexandra Norbach, Western Norway University of Applied Sciences, Ågotnes, Norway, Kotryna Bedrovaite Fjetland, Western Norway University of Applied Sciences, Kverneland, Norway, Gina Hestetun, Thomas Impelluso, Western Norway University of Applied Sciences, Bergen, Bergen, Norway*

**10:21am River Turbines Controlled by Mechanical Speed Converters**  
Technical Paper Publication. IMECE2018-88417  
*Navid Goudarzi, UNCC, Charlotte, NC, United States, Kyung Soo Han, DDMotion, Owings Mills, MD, United States*

**10:42am Design and Optimization of a Tidal Turbine and Farm**  
Technical Paper Publication. IMECE2018-86264  
*Mohammed Mayeed, Kennesaw State University, Marietta, GA, United States*

**11:03am** **Effect of Oscillating Water Column Chamber Inclination on the Performance of a Savonius Rotor**  
Technical Paper Publication. IMECE2018-87313  
*Deepak Prasad, Mohammed Rafiuddin Ahmed, The University of the South Pacific, Suva, Fiji, Young-Ho Lee, Korea Maritime and Ocean University, Busan, Korea (Republic)*

**11:24am** **An energy harvester for Kuroshio power**  
Technical Presentation. IMECE2018-88870  
*Bang-Fuh Chen, National Sun Yat-Sen University, Kaohsiung, Taiwan, Shang-Yu Tsai, National Sun Yat-sen University, Kaohsiung, Taiwan, Taiwan, Wei-Ren Chen, National Sun Yat sen University, Kaohsiung, Taiwan*

## **8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE**

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### **8-11-4 Thermal Aspects of Li-ion Batteries**

**Third Floor, David L. Lawrence Convention Center, Room 317 10:00am - 11:45am**

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Session Chair: **Dervis Demirocak**, *Texas A&M University-Kingsville, Kingsville, TX, United States*

**10:00am** **Effect of Thermal Gradient on Lithium Electrodeposition**  
Technical Presentation. IMECE2018-87621  
*Conner Fear, Purdue University, Lafayette, IN, United States*

**10:21am** **Low-Temperature Energy Efficiency of Lithium-Ion Batteries**  
Technical Paper Publication. IMECE2018-86582  
*Ashkan Nazari, Virginia Tech, Blacksburg, VA, United States, Roja Esmaeeli, Seyed Reza Hashemi, Haniph Aliniagerdroudbari, Siamak Farhad, University of Akron, Akron, OH, United States*

**10:42am** **A Hybrid Thermal Management System With Negative Parasitic Losses for Electric Vehicle Battery Packs**  
Technical Paper Publication. IMECE2018-86111  
*Shashank Arora, Kari Tammi, Aalto University, Espoo, Finland*

**11:03am** **A Novel Technique for Estimation of the Solid Electrolyte Interphase Film Resistance for Li-Ion Batteries**  
Technical Paper Publication. IMECE2018-87311  
*Shashank Arora, Aalto University, Espoo, Finland*

## **8-2 FUNDAMENTALS AND APPLICATIONS OF THERMODYNAMICS**

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### **8-2-4 On Entropy and irreversibilities' minimization**

**Room 311 1:45pm - 3:30pm**

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Session Chair: **Tatiana Morosuk**, *Technical University Berlin, Berlin, Germany*

Session Co-Chair: **Michael Nitsas**, *National Technical University of Athens, Zografou, Select State/Province, Greece*

**1:45pm** **An Easier Approach to Introduce Entropy in Undergraduate Thermodynamics Classes**  
Technical Paper Publication. IMECE2018-86510  
*Yousef Haseli, Central Michigan University, MT Pleasant, MI, United States*

**2:06pm** **Exergy Analysis of a Machining Operation Using Finite Element (FE) Assisted Simulations**  
Technical Paper Publication. IMECE2018-88494  
*Mohamed Gadalla, American University of Sharjah, Sharjah, United Arab Emir., Salman Pervaiz, Rochester Institute of Technology - Dubai, Dubai, Dubai, United Arab Emir.*

**2:27pm** **Entropy Generation Minimization for Energy-Efficient Desalination**  
Technical Paper Publication. IMECE2018-88543  
*John Lienhard V, Massachusetts Institute of Technology, Cambridge, MA, United States*

**2:48pm** **Spontaneous violations of the second law of thermodynamics, nanoscale fluid mechanics, and poromechanics**  
Technical Presentation. IMECE2018-88826  
*Martin Ostoja-Starzewski, Univ Of Illinois Urbana, Urbana, IL, United States*

**3:09pm** **Generalized Thermodynamic Dynamic-Optimization of Irreversible Processes**  
Technical Presentation. IMECE2018-88893  
*Lingen Chen, Naval University of Engineering, Wuhan, China*

## **8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS**

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### **8-4-5 Design and Analysis of Energy Systems ? 1**

**Third Floor, David L. Lawrence Convention Center, Room 316 1:45pm - 3:30pm**

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Session Chair: **Auteliano A Santos**, *Universidade Estadual de Campinas, Campinas, SP, Brazil*  
Session Co-Chair: **Roberto Carapellucci**, *University of L'Aquila, L'Aquila, IT, Italy*

**1:45pm** **Ecological Optimization for an Endoreversible Chemical Pump With Three Mass Reservoirs**  
Technical Paper Publication. IMECE2018-86250  
*Lingen Chen, Naval University of Engineering, Wuhan, China, DAn Xia, Huijun Feng, College of Power Engineering, Naval University of Engineering, Wuhan, China, Shaojun Xia, Naval University of Engineering, Wuhan, China*

**2:06pm** **Mechanical Design of Magnetic Gearboxes Optimized for Assembly**  
Technical Paper Publication. IMECE2018-86878  
*Sina Modaresahmadi, Casey Nichols, Wesley Williams, University of North Carolina at Charlotte, Charlotte, NC, United States*

**2:27pm** Design of a Ducted Cross-Flow Turbine for Marine Current Energy Extraction

Technical Paper Publication. IMECE2018-87324

*Jai N. Goundar, Deepak Prasad, Mohammed Rafiuddin Ahmed, The University of the South Pacific, Suva, Fiji*

**2:48pm** Vibration Energy Harvesting to Power Ultrasonic Sensors in Heavy Haul Railway Cars

Technical Paper Publication. IMECE2018-87836

*Auteliano A Santos, Universidade Estadual de Campinas, Campinas, SP, Brazil, Matheus V. Lopes, Vanessa V. Goncalves, Jony Eckert, University of Campinas, Campinas, SP, Brazil, Thiago S. Martins, VALE S.A., Vitoria, ES, Espirito Santo, Brazil*

**3:09pm** Reverberatory Furnace CFD Modeling for Efficient Design: Burners and Chimney Location

Technical Paper Publication. IMECE2018-87843

*Mohamed Ali, Saeed Alshehhi, Khalifa University of Science and Technology, Masdar City, Abu Dhabi, United Arab Emir.*

## **8-10 RENEWABLE ENERGY**

### **8-10-4 Advanced Technologies for Wind Energy II**

**Third Floor, David L. Lawrence Convention Center, Room 318 1:45pm - 3:30pm**

Session Chair: **Navid Goudarzi**, UNCC, Charlotte, NC, United States

Session Co-Chair: **Christopher Depcik**, University of Kansas Lawrence, KS, United States

**1:45pm** Self-Excited Induction Generator (SEIG) for Hydrogen and Ammonia C-free Fuel Production Without Electricity Grid Connection

Technical Presentation. IMECE2018-87527

*William Leighty, The Leighty Foundation, Juneau, AK, United States, Eduard Muljadi, Auburn University, Auburn, AL, United States*

**2:06pm** CFD Analysis of a Cross-Flow Turbine for Wind and Hydrokinetic Applications

Technical Paper Publication. IMECE2018-88469

*Arian Hosseini, KTH Royal Institute of Technology, Stockholm, Sweden, Navid Goudarzi, UNCC, Charlotte, NC, United States*

**2:27pm** "Wind Energy Assessment of Michigan City, United States"

Technical Paper Publication. IMECE2018-88412

*Michael Okorie, Uzumma O. Ozeh, Xiuling Wang, Purdue University Northwest, Hammond, Armenia*

**2:48pm** The Value of Energy Flexibility: Integrating Wind Resources in New York State

Technical Paper Publication. IMECE2018-87521

*Terence Conlon, Vijay Modi, Michael Waite, Columbia University, New York, NY, United States*

## **8-11 ELECTROCHEMICAL ENERGY CONVERSION AND STORAGE**

### **8-11-5 Beyond Li-ion Batteries**

**Third Floor, David L. Lawrence Convention Center, Room 317 1:45pm - 3:30pm**

Session Chair: **Dervis Demirocak**, Texas A&M University-Kingsville, Kingsville, TX, United States

**1:45pm** Development of a Membraneless Organic Redox Flow Battery

Technical Paper Publication. IMECE2018-88024

*Korey Cook, Michigan State University, East Lansing, MI, United States, Andre Benard, Michigan State Univ, East Lansing, MI, United States, Tom Guarr, Michigan State University Bioeconomy Institute, Holland, MI, United States, Shane Mann, MSU Bioeconomy Institute, Holland, MI, United States, Ethan Lau, Jordan Thayer, Michigan State University, East Lansing, MI, United States*

**2:06pm** CNT Reinforced Polymer Nanocomposites For Thermochemical Energy Conversion And Storage

Technical Presentation. IMECE2018-89525

*Oluwafunmilola Ola, Yanqiu Zhu, University of Exeter, Exeter, United Kingdom*

**2:27pm** Robust Nitrogen-doped Graphene On Metal Reduced Organic Framework catalyst for Oxygen Reduction Reactions

Technical Presentation. IMECE2018-88936

*Farsiananj Singh, New Jersey Institute of Technology, Newark, NJ, United States, Eun Soo Lee, New Jersey Institute of Technology (NJIT), Newark, NJ, United States, Bharath Babu Nunna, New Jersey Institute of Technology, Newark, NJ, United States, Ashok Pullamsetty, NJIT, Newark, NJ, United States*

**2:48pm** The Effect of Nanoscale Architecture on Ionic Diffusion in rGO/Aramid Nanofiber Structural Electrodes for Supercapacitors

Technical Presentation. IMECE2018-88911

*Sarah Aderyani, Haleh Ardebili, University of Houston, Houston, TX, United States*

**3:09pm** Improving Oil and Gas Operations by Integration of Solid Oxide Fuel Cells in a Sustainable Manner

Technical Presentation. IMECE2018-88919

*Khalid Al-Khori, Yusuf Bicer, Muammer Koc, Hamad bin Khalifa University, Doha, Qatar*

Draft Program

## 8-14 NUCLEAR POWER PLANTS: DESIGN, ANALYSIS, AND SAFETY

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### 8-14-1 Nuclear Power Plants: Design, Analysis, and Safety

Third Floor, David L. Lawrence Convention Center, Room 315 1:45pm - 3:30pm

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Session Chair: **Jovica Riznic**, *Canadian Nuclear Safety Commission, Ottawa, ON, Canada*

Session Co-Chair: **Hakan Ozaltun**, *Idaho National Laboratory, Idaho Falls, ID, United States*, **Grant Hawkes**, *Idaho National Laboratory, Idaho Falls, ID, United States*

#### 1:45pm Probabilistic Properties of Steel for Nuclear Piping

Technical Paper Publication. IMECE2018-87054

**Kleio Avrithi**, *University of Houston - Downtown, Houston, TX, United States*

#### 2:00pm Thermal Transport in Defective Actinide Oxides

Technical Paper Publication. IMECE2018-87605

**Alex Resnick**, **Katherine Mitchell**, **Jungkyu Park**, **Hannah Mair**, **Eduardo Farfan**, **Tien Yee**, **Christian Velasquez**, *Kennesaw State University, Marietta, GA, United States*

#### 2:15pm Thermo-hydro-chemo-mechanical modeling of Bentonite extrusion in the near borehole crack

Technical Presentation. IMECE2018-87944

**Mohammad Islam**, *National Energy Technology Laboratory, Pittsburgh, PA, United States*

#### 2:30pm Thermal Model of the AGR-5/6/7 Experiment

Technical Presentation. IMECE2018-88628

**Grant Hawkes**, *Idaho National Laboratory, Idaho Falls, ID, United States*

#### 2:45pm Numerical Simulation of Sub-Cooled Water Flashing Flow from Nuclear Steam Generator Secondary Side through Broken Feed Water Pipes

Technical Presentation. IMECE2018-88849

**Jong Chull Jo**, *Pusan National Univ., School of Mechanical Engineering/Korea Inst. of Nuclear Safety, Busan, Korea (Republic)*, **Jae Jun Jeong**, **Byong Jo Yun**, *Pusan National Univ., School of Mechanical Engineering, Busan, Korea (Republic)*, **Soon-ho Kang**, *Korea Inst. of Nuclear safety, Daejeon, Korea (Republic)*

#### 3:00pm Thermo-Mechanical Performance Assessment of Selected Plates From MP-1 Low Power Experiments

Technical Paper Publication. IMECE2018-86010

**Hakan Ozaltun**, **Barry H. Rabin**, *Idaho National Laboratory, Idaho Falls, ID, United States*

## 8-3 THERMOECONOMICS

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### 8-3-1 Thermoeconomics

Third Floor, David L. Lawrence Convention Center, Room 317 3:45pm - 5:30pm

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Session Chair: **Vittorio Verda**, *Politecnico di Torino - Dip Energetica Politech, Torino, Italy*

#### 3:45pm Thermoeconomic Analysis of Reverse Brayton Cycle Based Cryocooler

Technical Paper Publication. IMECE2018-87190

**Aman Kumar Dhillon**, **Parthasarathi Ghosh**, *Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

#### 4:06pm Ground Level Integrated Diverse Energy Storage (GLIDES) Cost Analysis

Technical Paper Publication. IMECE2018-87517

**Saaid Kassaee**, *University of Tennessee, Knoxville, TN, United States*, **Adewale Odukomaiya**, *Oak Ridge National Laboratory/Georgia Tech, Oak Ridge, TN, United States*, **Ahmad Abu-Heiba**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Xiaobing Liu**, *Energy and Transportation Science Division, Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Matthew M. Mench**, *University of Tennessee, Knoxville, TN, United States*, **Patrick W. O'Connor**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Ayyoub M. Momen**, *Oak Ridge National Lab, Oak Ridge, TN, United States*

#### 4:27pm Exergoeconomic Analysis Applied to a Novel Concept of Integrated Solar Combined Cycle

Technical Presentation. IMECE2018-87596

**Tatiana Mropsuk**, *Technical University Berlin, Berlin, Germany*, **Louay Elmorsy**, *TU Berlin, Berlin, Germany*, **George Tsatsaronis**, *Technical Univ Of Berlin, Berlin 10587, Germany*

#### 4:48pm MED-MVC systems: Exergy and thermo-economic analysis approach

Technical Presentation. IMECE2018-88361

**Mohamed L. Elsayed**, *University of Central Florida, ORLANDO, FL, United States*, **Osama Mesalhy**, *Zagazig University, Zagazig, Sharkia, Egypt*, **Ramy Mohammed**, **Louis Chow**, *University of Central Florida, ORLANDO, FL, United States*

#### 5:09pm "Exergoeconomic Analysis of Intercooled, Reheated and Recuperated Gas Turbine Cycles With Air Film Blade Cooling"

Technical Paper Publication. IMECE2018-88483

**Mohamed Gadalla**, **Waleed El-Damaty**, *American University of Sharjah, Sharjah, United Arab Emir.*

## 8-4 DESIGN AND ANALYSIS OF ENERGY CONVERSION SYSTEMS

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### 8-4-6 Design and Analysis of Energy Systems ? 2

Third Floor, David L. Lawrence Convention Center,  
Room 316 3:45pm - 5:30pm

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Session Chair: **Yousef Haseli**, *Central Michigan University, MT Pleasant, MI, United States*

Session Co-Chair: **Roberto Carapellucci**, *University of L'Aquila, L'Aquila, IT, Italy*

#### 3:45pm Specific Entropy Generation: A Measure of Inefficiencies in Power Plants

Technical Presentation. IMECE2018-88730

**Yousef Haseli**, *Central Michigan University, MT Pleasant, MI, United States*

#### 4:06pm A novel silica-gel/foam packed bed for adsorption cooling applications

Technical Presentation. IMECE2018-88913

**Ramy Mohammed**, *University of Central Florida, ORLANDO, FL, United States*, **Osama Mesalhy**, *Zagazig University, Zagazig, Sharkia, Egypt*, **Mohamed L. Elsayed**, **Louis Chow**, *University of Central Florida, ORLANDO, FL, United States*

#### 4:27pm Development of Dynamic Model for Mechanical Vapor Recompression System Simulation

Technical Presentation. IMECE2018-89124

**Le Wang**, *Hefei General Machinery Research Institute Co. Ltd, Hefei, China*, **Guangbin Liu**, *Qingdao University of Science and Technology, Qingdao, China*, **Jun Xiao**, *Hefei General Machinery Research Institute Co. Ltd, Hefei, China*

#### 4:48pm Studying the Degradation of Platinum Based Proton Exchange Membrane Fuel Cells Using the Nanoscale X-Ray Computed Tomography Method

Technical Presentation. IMECE2018-89572

**Jonathan Braaten**, **Shohei Ogawa**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Venkata Yarlagadda**, *General Motors/University of Michigan, Ann Arbor, MI, United States*, **Anusorn Kongkanand**, *General Motors Company, Fuel Cell Activities, Pontiac, MI, United States*, **Shawn Litster**, *Carnegie Mellon University, Pittsburgh, PA, United States*

## 8-7 THERMAL ENERGY STORAGE

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### 8-7-1 Thermal Energy Storage - Devices I

Third Floor, David L. Lawrence Convention Center,  
Room 315 3:45pm - 5:30pm

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Session Chair: **Adriano Sciacovelli**, *University of Birmingham, Birmingham, United Kingdom*

#### 3:45pm Longer Passage of Airflow in Multiple Packed-Bed Thin Tanks Versus in a Short Big Tank for Improved Thermal Storage Performance

Technical Paper Publication. IMECE2018-86123

**Yan Wang**, *Institute of Electrical Engineering Chinese Academy of Sciences, Beijing, China*, **Peiwen Li**, *University of Arizona, Tucson, AZ, United States*, **Zhifeng Wang**, **Bei Yang**, **Guofeng Yuan**, *Institute of Electrical Engineering, Chinese Academy of Sciences, Beijing, China*, **Wenxun Tang**, *Guangdong Five star Solar Energy, Dongguan, China*

#### 4:06pm Design and Integration of High Temperature Latent Heat Thermal Energy Storage for High Power Levels

Technical Paper Publication. IMECE2018-86281

**Maike Johnson**, *German Aerospace Center (DLR), Stuttgart, Germany*, **Bernd Hachmann**, *F. W. Bröckelmann Aluminiumwerk GmbH & Co. KG, Ense, Germany*, **Andreas J. Dengel**, *Steag New Energies GmbH, Saarbruecken, Germany*, **Michael FiB**, **Matthias Hempel**, **Dan Bauer**, *German Aerospace Center (DLR), Stuttgart, Germany*

#### 4:27pm Numerical Study of High Temperature Thermochemical Energy Storage Using Co<sub>3</sub>O<sub>4</sub>/CoO

Technical Paper Publication. IMECE2018-86329

**Nasser Vahedi**, **Qasim A. Ranjha**, **Alparslan Oztekin**, *Lehigh University, Bethlehem, PA, United States*

#### 4:48pm Analytical and computational thermal analysis of a latent heat storage and cooling system (LHSCS).

Technical Presentation. IMECE2018-86565

**Francisco Montero**, **Mario Di Capua**, **Amador Guzmán**, *Pontificia Universidad Católica de Chile, Santiago, Chile*, **Daming Chen**, **Loreto Campero**, *Pontificia Universidad Católica de Chile, Macul Region Metropolitana, Chile*

## 8-8 ENVIRONMENTAL ASPECTS OF ENERGY SYSTEMS

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### 8-8-1 Environmental Aspects of Energy Systems

Room 311 3:45pm - 5:30pm

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Session Chair: **Angel D. Ramirez**, *Escuela Superior Politécnica del Litoral, ESPOL, Guayaquil, Guayas, Ecuador*

Session Co-Chair: **Elisa Guelpa**, *Politecnico di Torino - DENERG, Torino, Italy*

#### 3:45pm "Modelling Produced Water Re-Injection Scaling Compatibility Performance in Matured Hydrocarbon Aquifer, Nigeria"

Technical Paper Publication. IMECE2018-86126

**Kingsley Abbulimen**, *University of Lagos, Lagos, OO, Nigeria*, **Theophilus. A. Fashanu**, *UNIVERSITY OF LAGOS, NIGERIA, Nigeria*, **Peter Idialu**, *Department of System Engineering, Lagos, Nigeria*

#### 4:06pm Some Studies on NOX Reduction From a Diesel Engine Using Stabilized Emulsion

Technical Paper Publication. IMECE2018-87374

**Naveen Kumar**, *Delhi Technological University, Delhi, Delhi, India*, **Harveer Singh Pali**, *JSS Academy of Technical Education, Noida, UP, India*, **Sidharth Bansal**, *MAIT, New Delhi, Delhi, India*

**4:27pm** "Mitigation of Greenhouse Gas Emissions Through the Shift From Fossil Fuels to Electricity in the Mass Transport System in Guayaquil, Ecuador"

**Technical Paper Publication.** IMECE2018-87732

**Angel D. Ramirez**, *Escuela Superior Politécnica del Litoral, ESPOL, Guayaquil, Guayas, Ecuador*, **Danilo Arcentales**, **Andrea J. Boero**, *Escuela Superior Politécnica del Litoral, ESPOL, Guayaquil, Guayas, Ecuador*

**4:48pm** **Water recovery in cooling towers**

**Technical Presentation.** IMECE2018-88687

**Maher Damak**, *MIT, Cambridge, MA, United States*, **Karim Khalil**, *MIT, Boston, MA, United States*, **Kripa Varanasi**, *Massachusetts Institute of Technology, Cambridge, MA, United States*

**5:09pm** **Life-cycle-analysis of novel heat exchanger for dry cooling of power plants based on encapsulated phase change materials**

**Technical Presentation.** IMECE2018-89633

**Lige Zhang**, **Swanand Bhagwat**, **Sabrina Spatari**, **Ying Sun**, *Drexel University, Philadelphia, PA, United States*

## 8-10 RENEWABLE ENERGY

### **8-10-5 Advanced Technologies for Solar Energy II**

**Third Floor, David L. Lawrence Convention Center, Room 318 3:45pm - 5:30pm**

Session Chair: **Christopher Depcik**, *University of Kansas, Lawrence, KS, United States*

Session Co-Chair: **Navid Gouzarzi**, *UNCC, Charlotte, NC, United States*

**3:45pm** **Development of a Low Cost Self-Sustaining Water Distillation System Using Activated Carbon Nanofluids**

**Technical Paper Publication.** IMECE2018-86906

**Ashreet Mishra**, *Purdue University Northwest, Hammond, IN, United States*, **A. G. Agwu Nnanna**, *University of Texas of the Permian Basin, Odessa, TX, United States*

**4:06pm** **Design and Testing of a Solar-Driven Wastewater Treatment Unit for Off-Grid Applications**

**Technical Paper Publication.** IMECE2018-87090

**Reza Baghaei Lakeh**, *Cal Poly Pomona, Pomona, CA, United States*, **Daniel Andrade**, *California State Polytechnic University, Pomona, Los Angeles, CA, United States*, **Kyle Miller**, *California State Polytechnic University, Pomona, Pomona, CA, United States*, **Mohammad Modabernia**, *Cal Poly Pomona, Pomona, CA, United States*, **Thuan Nguyen**, **Elbon Flanagan**, **Johnny Baradii**, **John Kest**, **David Jacobo**, **Justine Nguyen**, *California State Polytechnic University, Pomona, Pomona, CA, United States*, **Laura Lopez**, **Binh Phun**, *Cal Poly Pomona, Pomona, CA, United States*, **Saied Delagah**, *U.S. Bureau of Reclamation, Denver, CO, United States*, **Mohammadali Sharbatmaleki**, *California State Polytechnic University, Pomona, Pomona, CA, United States*

**4:27pm** **Numerical Study of Nanofluid-Based Solar Collector for Humidification-Dehumidification (HDH) Desalination**

**Technical Paper Publication.** IMECE2018-87318

**KAPIL GARG**, *Indian Institute of Technology Ropar, Rupnagar, PB, Punjab, India*, **Vikrant Khullar**, *Thapar Institute of Engineering and Technology, Patiala, India, Patiala, Pujab, India*, **Sarit Kumar Das**, **Himanshu Tyagi**, *Indian Institute of Technology Ropar, Rupnagar, PB, Punjab, India*

**4:48pm** **Performances Investigation of A SOFC-based Distributed Energy System Integrated with Solar Thermochemical Process**

**Technical Presentation.** IMECE2018-88392

**Taixiu Liu**, **Qibin Liu**, *Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, China*, **Jing Lei**, *School of Energy, Power and Mechanical Engineering, North China Electric Power University, Beijing, China*, **Jun Sui**, **Hongguang Jin**, *Institute of Engineering Thermophysics, Chinese Academy of Sciences, Beijing, Beijing, China*

## **WEDNESDAY, NOVEMBER, 14**

### 8-7 THERMAL ENERGY STORAGE

#### **8-7-2 Thermal Energy Storage - Materials**

**Third Floor, David L. Lawrence Convention Center, Room 323 10:00am - 11:45am**

Session Chair: **Mike Johnson**, *German Aerospace Center (DLR), Stuttgart, Germany*

Session Co-Chair: **Adriano Sciacovelli**, *University of Birmingham, Birmingham, United Kingdom*

**10:00am** **The Origin of Hydrophilic Surface Functionalization-Induced Thermal Conductance Enhancement across Solid-Water Interfaces**

**Technical Presentation.** IMECE2018-86409

**Dezhao Huang**, **RUIMIN MA**, *university of notre dame, south bend, IN, United States*, **Tengfei Luo**, *University of Notre Dame, Notre Dame, IN, United States*, **Teng Zhang**, *Schrodinger Inc., New York, NY, United States*

**10:21am** **"Experimental Study of Hygroscopy of Single and Different Mixtures of MgCl<sub>2</sub>, KCl, NaCl, ZnCl<sub>2</sub> for Application As Heat Transfer Fluids in CSP"**

**Technical Paper Publication.** IMECE2018-86416

**Xiaoxin Wang**, *University of Arizona, Tucson, AZ, United States*, **Qichao Hu**, **Xiankun Xu**, *The University of Arizona, Tucson, AZ, United States*, **Peiwen Li**, **Gil-Pyo Kim**, **Dominic Gervasio**, *University of Arizona, Tucson, AZ, United States*

**10:42am** **Thermal Analysis of a High-Temperature Heat Pipe-Assisted Thermal Energy Storage System With Nano-Enhanced Phase Change Material**

**Technical Paper Publication.** IMECE2018-86481

**Saeed Tiari**, **Mahboobe Mahdavi**, **Virensinh Thakore**, **Stacy Joseph**, *Gannon University, Erie, PA, United States*

**Draft Program**

**11:03am** **Non-Isothermal Phase Change Behaviors of Binary Mixtures of D-Dulcitol and Pentaerythritol As Novel Heat Storage Materials**

**Technical Paper Publication.** IMECE2018-87643

**Xuefeng Shao, Jun Wang**, Zhejiang University, Hangzhou, Zhejiang, China, **Liwu Fan**, Zhejiang University, Hangzhou, Zhejiang, China

**11:24am** **Atomistic modelling and experimental characterization of water sorption onto silicoaluminophosphate zeolites for low temperature thermal storage applications**

**Technical Presentation.** IMECE2018-89000

**Eliodoro Chiavazzo, Matteo Fasano, Gabriele Falciani**, Politecnico Di Torino, Torino, Italy, **Vincenza Brancato**, CNR - Istituto di Tecnologie Avanzate per l'Energia ?Nicola Giordano?, Messina, Italy, **Valeria Palomba**, Università di Messina, Messina, Italy, **Pietro Asinari**, Politecnico Di Torino, Torino 10129, Italy, **Andrea Frazzica**, CNR - Istituto di Tecnologie Avanzate per l'Energia ?Nicola Giordano?, Messina, Italy

## **8-9 ENERGY SYSTEMS FOR BUILDINGS**

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### **8-9-1 Cooling Technologies**

**Third Floor, David L. Lawrence Convention Center, Room 319 10:00am - 11:45am**

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Session Chair: **Yunho Hwang**, Univ Of Maryland, College Park, MD, United States

**10:00am** **Thermal Performance of Earth-Air Heat Exchanger Systems for Cooling Applications in Residential Buildings**

**Technical Paper Publication.** IMECE2018-86974

**Fadi Ghaith**, Heriot Watt University Dubai Campus, Dubai, United Arab Emir., **Habib Ur Razaq**, Heriot Watt University, Dubai, United Arab Emir.

**10:21am** **Using Adsorption Cooling and Thermal Solar Collection for Residential Cooling Applications in Canada**

**Technical Paper Publication.** IMECE2018-87246

**Jordan McNally, Christopher Baldwin, Cynthia A. Cruickshank**, Carleton University, Ottawa, ON, Canada

**10:42am** **Thermal Modeling of a Building Integrated Radiative Cooler for Space**

### **Cooling Applications**

**Technical Paper Publication.** IMECE2018-87456

**Ravita Lamba**, Indian Institute of Technology Delhi, New Delhi, Delhi, India, **Mehdi Zeyghami, David Young**, University of South Florida, Tampa, FL, United States, **D. Yogi Goswami**, Univ Of South Florida, Tampa, FL, United States, **S.C. Kaushik**, Indian Institute of Technology Delhi, New Delhi, New Delhi, India

**11:03am** **Economical and Non-Invasive Residential Human Presence Sensing via Temperature Measurement**

**Technical Paper Publication.** IMECE2018-88211

**Chenli Wang, Hohyun Lee**, Santa Clara University, Santa Clara, CA, United States

**11:24am** **Neural Network Based Bin Analysis for Indirect/Direct Evaporative Cooling of Modular Data Centers**

**Technical Paper Publication.** IMECE2018-88502

**Abhishek Uday Walekar**, University of Texas, Arlington, Arlington, TX, United States, **Ashwin Siddarth**, University of Texas Arlington, Arlington, TX, United States, **Abhishek Guhe**, Mestek, A Division of Mestek Inc., Dallas, TX, United States, **Nikita R Sukthankar**, University of Texas, Arlington, Arlington, TX, United States, **Dereje Agonafer**, University of Texas At Arlington, Arlington, TX, United States

## **8-10 RENEWABLE ENERGY**

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**8-10-6 Energy Storage, Energy Harvesting, and Electric Cars**

**Third Floor, David L. Lawrence Convention Center, Room 325 10:00am - 11:45am**

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Session Chair: **Emrah Celik**, University of Miami, Pinecrest, FL, United States

**10:00am** **Increasing Energy Efficiency in Vehicles by Harvesting Wasted Engine Heat**

**Technical Paper Publication.** IMECE2018-88253

**Emrah Celik**, University of Miami, Pinecrest, FL, United States, **mutabe Aljaghtham**, University of Miami, Miami, FL, United States

**10:21am** **Enhancement of Thermoelectric Figure of Merit of Bi<sub>2</sub>Te<sub>3</sub> Using Carbon Dots**

**Technical Paper Publication.** IMECE2018-88280

**Emrah Celik**, University of Miami, Pinecrest, FL, United States, **Cagri Oztan**, University of Miami, Coral Gables, FL, United States, **Yiqun Zhou, Roger LeBlanc**, University of Miami, Miami, FL, United States, **Sedat Ballikaya, Oguz Genc**, Istanbul University, Istanbul, Turkey

**10:42am** **Design and Fabrication of Three Stages Solar Still with Two Focal Concentric Collectors**

**Technical Presentation.** IMECE2018-89027

**Fayadh Abed, khalil Farhan, Muhammad Eleiwi**, tikrit university, tikrit, SalahAdeen, Iraq

**11:03am** Evaluation of Thermal Energy Storage (TES) Systems on Thermo-Economic Characteristics of PTSC Solar-Based Power Generation Plants  
Technical Paper Publication. IMECE2018-88477  
**Mohamed Gadalla, Adnan Alashkar**, American University of Sharjah, Sharjah, United Arab Emir.

**11:24am** Magnets for tomorrow  
Technical Presentation. IMECE2018-89047  
**Anish B Soman**, SCMS School of Engineering and Technology, Kerala, Kerala, India, **Balendu Divakar**, SCMS School of Engineering and Technology, Ernakulam, Kerala, Kerala, India, **Anoop Anilkumar**, SCMS School of Engineering and Technology, Kerala, Kerala, India, **SOORYA NATH K U**, SCMS School of Engineering and Technology, KERA, Kerala, India

## **8-12 FUEL CELL SYSTEMS DESIGN AND APPLICATIONS**

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### **8-12-1 PEM Fuel Cells - I**

**Third Floor, David L. Lawrence Convention Center, Room 324 10:00am - 11:45am**

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Session Chair: **Dervis Demirocak**, Texas A&M University-Kingsville, Kingsville, TX, United States

**10:00am** Investigation of Cell Reversal of Polymer Electrolyte Fuel Cells in Freezing Conditions  
Technical Presentation. IMECE2018-89394  
**Leiming Hu**, Carnegie Mellon University, Pittsburgh, PA, United States, **Bo Ki Hong**, **Jon-Gil Oh**, Hyundai Motor Company, Yongin-si, Gyeonggi-do, Korea (Republic), **Shawn Litster**, Carnegie Mellon University, Pittsburgh, PA, United States

**10:21am** Electrode and Membrane Development for Anion Exchange Membrane Fuel Cells  
Technical Presentation. IMECE2018-89428  
**Dylan Ritter, Leiming Hu, Megan Treichel, Tyler Womble, Kevin Noonan, Shawn Litster**, Carnegie Mellon University, Pittsburgh, PA, United States

**10:42am** Enhanced water management for platinum group metal-free polymer electrolyte fuel cells by engineered gas diffusion layers  
Technical Presentation. IMECE2018-89565  
**Lisa Langhorst, Aman Uddin**, Carnegie Mellon University, Pittsburgh, PA, United States, **Hanguang Zhang, Gang Wu**, University at Buffalo, Buffalo, NY, United States, **Shawn Litster**, Carnegie Mellon University, Pittsburgh, PA, United States

**11:03am** Structural Analysis of MEA Considering Catalyst Layer Microstructure  
Technical Presentation. IMECE2018-87385  
**Tomaru Ogawa**, Nissan Motor Co., Ltd., Yokosuka, Kanagawa, Japan, **Norio Saito**, Nissan Motor Co., Ltd. Advanced Materials Laboratory, Yokosuka, Kanagawa, Japan, **Shinichi Takahashi, Atsushi Ohma**, Nissan Motor Co., Ltd. Advanced Materials Laboratory, Yokosuka, Kanagawa, Japan

**11:24am** Non Equilibrium Thermodynamics explains Thermal Osmosis in PEM Fuel Cells  
Technical Presentation. IMECE2018-87853  
**Nicholas Ingarra**, Oakland University, Rochester, MI, MI, United States, **Xia Wang**, Oakland Univ, Rochester, MI, United States

## **8-7 THERMAL ENERGY STORAGE**

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### **8-7-3 Thermal Energy Storage - Devices II**

**Third Floor, David L. Lawrence Convention Center, Room 323 1:45pm - 3:30pm**

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Session Chair: **Adriano Sciacovelli**, University of Birmingham, Birmingham, United Kingdom

Session Co-Chair: **Maike Johnson**, German Aerospace Center (DLR), Stuttgart, Germany

**1:45pm** Heat Transfer Analysis of a Low-Temperature Heat Pipe-Assisted Latent Heat Thermal Energy Storage System With Nano-Enhanced PCM  
Technical Paper Publication. IMECE2018-86609  
**Mahboobe Mahdavi, Saeed Tiari, Vivek Pawar**, Gannon University, Erie, PA, United States

**2:06pm** Experimental and Numerical Study on Melting of Solar Salt in a Finned Metallic Container  
Technical Paper Publication. IMECE2018-88072  
**Sol-Carolina Costa**, Northumbria University, Newcastle, United Kingdom, **Khamid Mahkamov**, Northumbria University, Newcastle upon Tyne, United Kingdom, **Murat Kenisarin**, Northumbria University, Newcastle, United Kingdom, **Mohammad Ismail**, Northumbria University, Newcastle, United Kingdom, **Elvedin Hainic**, **Sevic Mullen**, Aavid Thermacore Europe Ltd, Ashington, United Kingdom, **Kevin Lynn**, Aavid Thermacore Europe Ltd, Ashington, Northumberland, United Kingdom, **Thomas Werner**, Aavid Thermacore Europe Ltd, Ashington, United Kingdom

**2:27pm** Layout of Phase Change Materials in a Thermal Energy Storage System  
Technical Paper Publication. IMECE2018-88636  
**Habeb Ur Rahman Khan, Taha Aldoss, Muhammad Rahman**, Wichita State University, Wichita, KS, United States

**2:48pm** Numerical Investigation of Thermal Performance for Plate Type PCM Thermal Storage Unit  
Technical Paper Publication. IMECE2018-88667  
**Chen Mengdong, Yang Cenyu, Jin Yi, Hu Xiao**, Global Energy Interconnection Research Institute, Beijing, China

## **8-9 ENERGY SYSTEMS FOR BUILDINGS**

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### **8-9-2 Building Energy Generation**

**Third Floor, David L. Lawrence Convention Center, Room 319 1:45pm - 3:30pm**

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Session Chair: **Sayed M. Metwalli**, Cairo University, Cairo, Egypt

**1:45pm** "Energy Demand, Efficiency Measures and Embodied Energy in the Italian Residential Sector"

Technical Paper Publication. IMECE2018-86400

*Sara Abd Alla, University of Genoa, Genoa, Genoa, Italy, Vincenzo Bianco, Scarpa Federico, University of Genoa, Genova, Italy, Italy, Luca Tagliafico, Univ Of Genoa/diptem/tec, Genoa 16145, Italy*

**2:06pm** Feasibility Analysis of Distributed Generation System for Large University Campus

Technical Paper Publication. IMECE2018-86477

*Amy Allen, Moncef Krarti, University of Colorado Boulder, Boulder, CO, United States*

**2:27pm** Evaluation of Optimal Designs for Hybrid Renewable Energy Systems Specific to Residential Communities in Saudi Arabia

Technical Paper Publication. IMECE2018-88090

*Ammar H.A. Dehwah, Moncef Krarti, University of Colorado Boulder, Boulder, CO, United States*

**2:48pm** Potential Aggregate Effects of Net-Zero Energy Homes (NZEHS) With Distributed Energy Generation on the U.S. Electrical Grid

Technical Paper Publication. IMECE2018-88359

*Dongsu Kim, Heejin Cho, Rogelio Luck, Pedro Mago, Mississippi State University, Mississippi State, MS, United States*

**3:09pm** Towards Net-Zero Energy Buildings: A Case Study in Humid Subtropical Climate

Technical Paper Publication. IMECE2018-88518

*Owen G. Betharte, Hamidreza Najafi, Troy Nguyen, Florida Institute of Technology, Melbourne, FL, United States*

## 8-10 RENEWABLE ENERGY

**8-10-7 Biomass, Geothermal, and Small Scale Generation**

**Third Floor, David L. Lawrence Convention Center, Room 325 1:45pm - 3:30pm**

Session Chair: **Navid Goudarzi**, UNCC, Charlotte, NC, United States

Session Co-Chair: **Lea-Der Chen**, Texas A&M University-Corpus Christi, Corpus Christi, TX, United States

**1:45pm** Radiative Transport and Hydrodynamic Modeling of Microalgae Photosynthesis in Bio-Flow Reactors

Technical Paper Publication. IMECE2018-87116

*Lea Der Chen, Texas A&M University - Corpus Christi, Corpus Christi, TX, United States*

**2:06pm** Hot Surface Ignition Properties of Jet-A/Canola Methyl Ester Blends in a Constant Volume Chamber

Technical Paper Publication. IMECE2018-87544

*Bach Duong, University of Oklahoma, Norman, OK, United States, Ramkumar N. Parthasarathy, Subramanya Gollahalli, Univ Of Oklahoma, Norman, OK, United States*

**2:27pm** Combustion Modelling of a 20 kW Pellet Boiler

Technical Paper Publication. IMECE2018-88063

*Joao Silva, University of Minho, Guimaraes, Select State/Province, Portugal, Lelis Fraga, National University of East Timor, Dili, Select State/Province, East Timor, Manuel Eduardo Ferreira, University Of Minho, Guimaraes, Portugal, Sergio Chapela, Jacobo Porteiro, University of Vigo, Vigo, Spain, Senhorinha Teixeira, Jose Teixeira, University of Minho, Guimaraes, Select State/Province, Portugal*

**2:48pm** Improvement in Compost Waste Heat Recovery System Using LDPE Insulation

Technical Paper Publication. IMECE2018-88597

*NIKHIL SHRIKANT MANE, PVPIT, Budhgaon, sangli, maharashtra, India, Narayanrao Hargude, RIT Sakharale, Budhgaon Maharashtra, India, Manoj Yadav, PVPIT, Budhgaon, Sangli, Maharashtra, India, Avinash Patil, SBGI, Miraj, Sangali, Maharashtra, India, Mukund L Harugade, PVPIT, Budhgaon, Sangli, Maharashtra, India*

**3:09pm** Exploration of solar hybridization and thermal energy storage to enhance geothermal power generation and dispatchability

Technical Presentation. IMECE2018-89596

*Guangdong Zhu, NREL, Englewood, CO, United States, Joshua Dominic McTigue, NREL, Golden, CO, United States, Kevin Kitz, Kitzworks, Boise, ID, United States, Greg Mungas, Hyperlight Energy, Riverside, CA, United States, Daniel Wendt, INL, Idaho Springs, ID, United States*

## 8-12 FUEL CELL SYSTEMS DESIGN AND APPLICATIONS

### 8-12-2 PEM Fuel Cells - II

**Third Floor, David L. Lawrence Convention Center, Room 324 1:45pm - 3:30pm**

Session Chair: **Partha Mukherjee**, Purdue University, West Lafayette, IN, United States

**1:45pm** Improving Thermal Performance of a PEMFC With Wavy Serpentine Flow Channels: A Parametric Study

Technical Paper Publication. IMECE2018-86145

*Yuxin Jia, Hongbin Yan, Northwestern Polytechnical University, Xi'an, China, Bengt Sunden, Lund University, Lund, Sweden, Gongnan Xie, Northwestern Polytechnical University, Xi'an, China*

**2:06pm** Numerical Simulation of Droplet Emergence and Growth From Gas Diffusion Layers (GDLs) in Proton Exchange Membrane (PEM) Fuel Cell Flow Channels

Technical Paper Publication. IMECE2018-86579

*Jingru Benner, Anthony Santamaria, Mehdi Mortazavi, Western New England University, Springfield, MA, United States*

**2:27pm** Modeling Three-Dimensional Complex Flow-Fields of Proton Exchange Membrane Fuel Cells With Gas Density Change in Cathode

Technical Paper Publication. IMECE2018-88388

*Jinyong Kim, The Pennsylvania State University, State College, PA, United States, Chao-Yang Wang, Pennsylvania State University, University Park, PA, United States*

Draft Program

**2:48pm** Catalyst-scale Simulation of Transport and Reaction on 3D STEM-CT Images of Carbon-supported Pt Catalyst for Polymer Electrolyte Fuel Cells

Technical Presentation. IMECE2018-89664

*Shohei Ogawa, Carnegie Mellon University, Pittsburgh, PA, United States, Elliot Padgett, David A. Muller, School of Applied and Engineering Physics, Cornell University, Ithaca, NY, United States, Anusorn Kongkanand, General Motors Company, Fuel Cell Activities, Pontiac, MI, United States, Shawn Litster, Carnegie Mellon University, Pittsburgh, PA, United States*

**3:09pm** Optimization of Triple Phase Boundary Length in YSZ-Carbon-Nanotube Composites

Technical Presentation. IMECE2018-86946

*Shiuan-Duo Chiang, Jordan Miller, Leila Ladani, University of Texas at Arlington, Arlington, TX, United States*

## 8-7 THERMAL ENERGY STORAGE

### 8-7-4 Thermal Energy Storage - Systems Integration

**Third Floor, David L. Lawrence Convention Center, Room 323 3:45pm - 5:30pm**

Session Chair: *Peiwen Li, University of Arizona, Tucson, AZ, United States*

**3:45pm** Examining Ice Storage and Solar PV As a Potential Push Toward Sustainability for Qatar

Technical Paper Publication. IMECE2018-86709

*Ibraheam Al-Aali, Vijay Modi, Columbia University, New York, NY, United States*

**4:06pm** Analysis of Phase Change Thermal Storage Configurations for Minichannel-Based Solar Collectors

Technical Paper Publication. IMECE2018-87837

*Sai Kiran Hota, Julio Perez, University of California - Merced, Merced, CA, United States, Gerardo Diaz, Univ Of California Merced, Merced, CA, United States*

**4:27pm** Using Forecasted Daily Maximum Temperatures to Control a Chiller Thermal Storage System

Technical Paper Publication. IMECE2018-88307

*Christopher Baldwin, Cynthia A. Cruickshank, Carleton University, Ottawa, ON, Canada*

**4:48pm** Novel thermochemical heat storage system for medium temperature range

Technical Presentation. IMECE2018-89845

*Arpit Dwivedi, Manjunath Rajagopal, University of Illinois, Urbana, IL, United States, Srirupa Ganguly, B K Sharma, Kishore Rajagopalan, Illinois Sustainable Technology Center, Champaign, IL, United States, Sanjiv Sinha, University of Illinois, Urbana, IL, United States*

## 8-9 ENERGY SYSTEMS FOR BUILDINGS

### 8-9-3 Building Structure/Materials for Load Reduction

**Third Floor, David L. Lawrence Convention Center, Room 319 3:45pm - 5:30pm**

Session Chair: *Hohyun Lee, Santa Clara University, Santa Clara, CA, United States*

**3:45pm** Influence of Façade Area on Thermal Performance of Building for Cooling Purposes

Technical Paper Publication. IMECE2018-86033

*Hamad Almutairi, Abdulrahman Almutairi, Jaber H. Almutairi, Public Authority For Applied Education and Training, Kuwait, OO, Kuwait*

**4:06pm** Effect of Inlet Location on Ventilation Flow Through a Room Fitted With Solar Chimney

Technical Paper Publication. IMECE2018-87051

*Kashif Nazir, University of Technology Sydney, Ultimo, NSW, Australia, B. Phuoc Huynh, Univ Of Tech Sydney, Broadway Nsw 2007, Australia*

**4:27pm** Wood - Concrete Composite for Thermally Insulated Building Construction Material

Technical Paper Publication. IMECE2018-87340

*Anuj Gupta, Harishchandra Thakur, Gautam Buddha University, Gautam Budh Nagar, Uttar Pradesh, India*

**4:48pm** A Numerical Approach for the Evaluation of the Energy Efficiency in Ventilated Façade

Technical Paper Publication. IMECE2018-87525

*Massimo Mani, Luca Montorsi, Matteo Venturelli, University of Modena and Reggio Emilia, Reggio Emilia, Select State/Province, Italy*

**5:09pm** "Thermal Behavior of Soils Under Tidal Effect: A Case Study in Guayaquil, Ecuador"

Technical Paper Publication. IMECE2018-87738

*Daniel Moreira, Ruben Hidalgo-Leon, Escuela Superior Politecnica del Litoral, Guayaquil, — Select —, Ecuador, Jose Macias, Instituto Nacional de Eficiencia Energética y Energías Renovables INER, Guayaquil, — Select —, Ecuador, Guillermo E. Soriano, ESPOI Polytechnic University, Guayaquil, Guayas, Ecuador*

## 8-10 RENEWABLE ENERGY

### 8-10-8 Feasibility and Techno-Economic Analysis of Renewable Energy Technologies

**Third Floor, David L. Lawrence Convention Center, Room 325 3:45pm - 5:30pm**

Session Chair: *Jose C. Pascoa, Universidade Da Beira Interior, Covilha 6200, Portugal*

**3:45pm Disc Turbine for Energy Harvesting**

**Technical Paper Publication.** IMECE2018-88143

*Jose C. Pascoa, Universidade Da Beira Interior, Covilha 6200, Portugal, **Silvio Cândido**, Universidade da Beira Interior, Covilhã, Portugal, **Fernando Charrua-santos**, Unibiversity of beira iNterior, covilha, Portugal, **Antonio Espirito-Santo**, **Marco Canario**, Universidade da Beira Interior, Covilhã, Select State/Province, Portugal*

**4:06pm "How Solar and Storage Can Reduce Coincident Peak Loads and Payments: A Case Study in Austin, TX"**

**Technical Paper Publication.** IMECE2018-86482

*Arkasama Bandyopadhyay, **Joshua D. Rhodes**, **Julia P. Conger**, **Michael E. Webber**, The University of Texas At Austin, Austin, TX, United States*

**4:27pm Annual Performance Investigation of Finned Double-Pass Solar Air Heater Installed in Sudan**

**Technical Presentation.** IMECE2018-89024

*Mohand H. Mohamed, Penn State University Harrisburg, Harrisburg, PA, United States, **Issam Abu-Mahfouz**, Penn State Uni Harrisburg, Middletown, PA, United States*

**4:48pm Deep Decarbonization of Total Global Energy: Hydrogen and Ammonia C-free Fuels vs. Electricity as Integrated CO<sub>2</sub>-emission-free Energy Systems**

**Technical Presentation.** IMECE2018-86187

*William Leighty, The Leighty Foundation, Juneau, AK, United States*

**5:09pm Performance of a Greenhouse Equipped with Light-Splitting Material and Desalination Unit**

**Technical Presentation.** IMECE2018-93377

*Sina Jahangiri Mamouri, James Jausner, Michigan State University, East Lansing, MI, United States, **Xiongguo Yang**, University of Colorado, Boulder, CO, United States, **Andre Benard**, Michigan State Univ, East Lansing, MI, United States*

**8-12 FUEL CELL SYSTEMS DESIGN AND APPLICATIONS**

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**8-12-3 Fuel Cell Systems and Infrastructure**

**Third Floor, David L. Lawrence Convention Center, Room 324 3:45pm - 5:30pm**

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Session Chair: **George Nelson**, University of Alabama in Huntsville, Huntsville, AL, United States

**3:45pm Dynamic Behavior of a Solid Oxide Steam Electrolyzer System Using Transient Photovoltaic Generated Power for Renewable Hydrogen Production**

**Technical Paper Publication.** IMECE2018-86685

*Alireza Saeedmanesh, Department of Mechanical and Aerospace Engineering, University of California, Irvine, Irvine, CA, United States, **Paolo Colombo**, Department of Mechanical and Aerospace Engineering, Politecnico di Torino, Torino, Torino, Italy, **Jack Brouwer**, Department of Mechanical and Aerospace Engineering, University of California, Irvine, Irvine, CA, United States*

**4:06pm Resolving the Electrochemical Equations of a Solid Oxide Fuel Cell for Use in Transient Simulation and Integration Into Cyber-Physical Systems**

**Technical Paper Publication.** IMECE2018-87770

*Jesus Arias, Georgia Institute of Technology, Atlanta, GA, United States, **Comas Haynes**, **Aklilu Giorges**, Georgia Tech Research Institute, Atlanta, GA, United States*

**4:27pm Electrolyzer Exergy Analysis for an Environmental Control and Life Support System**

**Technical Paper Publication.** IMECE2018-88119

*Raymond Chow, University of Alabama in Huntsville, Huntsville, AL, United States, **Jay Perry**, NASA Marshall Space Flight Center, Huntsville, AL, United States, **George Nelson**, University of Alabama in Huntsville, Huntsville, AL, United States*

**4:48pm Gaseous Fuel Leakage From Natural Gas Infrastructure**

**Technical Paper Publication.** IMECE2018-88271

*Nohora Hormaza Mejia, **Jack Brouwer**, National Fuel Cell Research Center/ University of California, Irvine, Irvine, CA, United States*

**5:09pm Assessments from an Expert Elicitation Workshop on the Cost, Performance, and Market Viability of Solid Oxide Fuel Cells**

**Technical Presentation.** IMECE2018-89895

*Michael Whiston, **Inês Azevedo**, **Shawn Litster**, **Constantine Samaras**, **Kate S. Whitefoot**, **Jay F. Whitacre**, Carnegie Mellon University, Pittsburgh, PA, United States*

**Draft Program**  
Fluids Engineering  
TUESDAY, NOVEMBER, 13

**9-17 FLUIDS ENGINEERING PLENARIES**

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**9-17-1 Fluids Engineering Plenary I**

**Third Floor, David L. Lawrence Convention Center, Room 301 8:00am - 8:45am**

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**8:00am Interface Actuations for Micro/Nano Fluidics Plenary Presentation.** IMECE2018-90100

***Sung Kwon Cho**, University of Pittsburgh, pittsburgh, PA, United States*

**9-17 FLUIDS ENGINEERING PLENARIES**

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**9-17-2 Fluids Engineering Plenary II**

**Third Floor, David L. Lawrence Convention Center, Room 301 9:00am - 9:45am**

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**9:00am Microfluidic Rheometry of Complex Fluids Plenary Presentation.** IMECE2018-90101

***Gareth McKinley**, MIT, Cambridge, MA, United States*

**9-3 25TH SYMPOSIUM ON FLUID MECHANICS AND RHEOLOGY OF NONLINEAR MATERIALS AND COMPLEX FLUIDS**

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**9-3-1 Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids - I**

**Third Floor, David L. Lawrence Convention Center, Room 319 10:00am - 11:45am**

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Session Chair: **Dennis A. Siginer**, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*  
Session Co-Chair: **Mhamed Boutaous**, *Universite de Lyon, Villeurbanne, France*

**10:00am** **Brownian Dynamics Simulations of Aggregation Phenomena in a Magnetic Particle Suspension With an Alternating Magnetic Field (Relationship Between the Aggregate Structure and the Heat Production)**  
Technical Paper Publication. IMECE2018-86544  
**Seiya Suzuki, Akira Satoh, Muneo Futamura**, *Akita prefectural University, Yuri-Honjo, Akita, Japan*

**10:21am** **The Effect of Porous Support Layer in Forward Osmosis Membranes: A Computational Fluid Dynamics Simulation**  
Technical Paper Publication. IMECE2018-86328  
**Ahmed M. Alshwairekh, Abdullah A. Alghafis, Mustafa Usta, Anas Alwatban, Robert M. Krysko, Alparslan Oztekin**, *Lehigh University, Bethlehem, PA, United States*

**10:42am** **3D Modeling of the Thermal Phenomena During Laser Melting of Polymers**  
Technical Paper Publication. IMECE2018-87549  
**Mhamed Boutaous**, *Universite de Lyon, Villeurbanne, France*, **Aoulaiche Mokrane, Shihe Xin**, *INSA de Lyon, Villeurbanne, France*, **Dennis A. Siginer**, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

**11:03am** **Analysis of Melt Flows in an Electric Heating Furnace for Quartz Glass Synthesis**  
Technical Paper Publication. IMECE2018-86112  
**Qianli Ma, Haisheng Fang**, *Huazhong University of Science & Technology, Wuhan, Hubei, China*, **Chunli Shang**, *Hubei Feilihua Quartz Glass Co., Ltd., Jingzhou, Hubei, China*, **Zhongyi Liu, Jing Wang**, *Huazhong University of Science & Technology, Wuhan, Hubei, China*

**11:24am** **3D Monte Carlo Simulations on the Preferred Configuration of Cubic Hematite Particles in the Aggregate Structures**  
Technical Presentation. IMECE2018-86635  
**Kazuya Okada, Akira Satoh, Muneo Futamura**, *Akita Prefectural University, Yuri-honjo, Akita, Japan*

**9-5 SYMPOSIUM ON CFD APPLICATIONS FOR OPTIMIZATION AND CONTROLS**

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**9-5-1 CFD Applications for Flow Optimization and Control - I**

**Third Floor, David L. Lawrence Convention Center, Room 323 10:00am - 11:45am**

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Session Chair: **Zhongquan Charlie Zheng**, *University of Kansas, Lawrence, KS, United States*  
Session Co-Chair: **Ning Zhang**, *McNeese State University, Lake Charles, LA, United States*, **Philipp Epple**, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

**10:00am** **Investigation of Three-Dimensional Lagrangian Coherent Structures in Flow Past Single and Arrays of Plate: Linear Energy Harvesting Applications**  
Technical Paper Publication. IMECE2018-86332  
**Bashar Attiya, I-Han Liu, Cosan Daskiran, Muhannad Altimemy, Alparslan Oztekin**, *Lehigh University, Bethlehem, PA, United States*

**10:21am** **High Resolution Overset Structured Grid RANS Simulations of Flow Past a Surface Mounted Cube Using Eddy Viscosity Closure Models**  
Technical Paper Publication. IMECE2018-86480  
**Marc Goldbach**, *University of North Carolina at Charlotte, Tega Cay, SC, United States*, **Mesbah Uddin**, *North Carolina Motor-sports and Automotive Research Center, Charlotte, NC, United States*

**10:42am** **A Method to Reduce Drag Coefficient for Fuel Efficiency in Semi-Truck Trailer and Trailer Stability**  
Technical Paper Publication. IMECE2018-86584  
**Anu Nair, Fred Barez**, *San Jose State University, San Jose, CA, United States*, **Metin Ozen**, *Ozen Engineering, Inc, San Jose, CA, United States*, **Ernie Thurlow**, *San Jose State University, San Jose, CA, United States*

**11:03am** **Effect of Underbody Geometry on the Fuel Efficiency of Gasoline and Electric Vehicles**  
Technical Paper Publication. IMECE2018-86629  
**Krishnaswamy Mahadevan, Fred Barez, Davood Abdollahi-an, Ernie Thurlow**, *San Jose State University, San Jose, CA, United States*

**11:24am** **CFD Simulation of Multiphase Flow in Concentric Annuli**  
Technical Paper Publication. IMECE2018-86640  
**Amina Shynybayeva, Luis Rojas-Solorzano**, *Nazarbayev University, Astana, Select State/Province, Kazakhstan*, **Kristian J. Sveen**, *Institute for Energy Technology, Kjeller, Select State/Province, Norway*

**Draft Program**

## 9-9 MICROFLUIDICS 2018 - FLUID ENGINEERING IN MICRO- AND NANOSYSTEMS

### 9-9-1 Mathematical Modeling in Microfluidics

**Third Floor, David L. Lawrence Convention Center, Room 324 10:00am - 11:45am**

Session Chair: **Jae Sung Park**, *University of Nebraska-Lincoln, Lincoln, NE, United States*

Session Co-Chair: **Nazmul Islam**, *Univ of Texas Rio Grande Valley, Edinburg, TX, United States*

**10:00am Modelling on Predicting Pressure Distribution and Capacity of Foil Thrust Bearing**

Technical Paper Publication. IMECE2018-86085

**ZHENG XU, Fenzhu Ji, YU ZHOU, SHUITING DING, Fanyong Wu**, *BEIHANG UNIVERSITY, BEIJING, China*

**10:21am Combined Magneto-hydrodynamic/Pressure Driven Flow of Multi-Layer Pseudoplastic Fluids Through a Parallel Flat Plates Microchannel**

Technical Paper Publication. IMECE2018-86676

**Juan R. Gomez**, *Instituto Politecnico Nacional, SEPI-ESIME Azcapotzalco, Ciudad De Mexico, Mexico*, **Juan P. Escandon**, *Instituto Politecnico Nacional, SEPI-ESIME Unidad Azcapotzalco, Departamento de Termofluidos, Ciudad de México, Select State/Province, Mexico*

**10:42am Theoretical and Numerical Analysis of Mixing of Confined Nanodroplets**

Technical Presentation. IMECE2018-86323

**Alireza Karbalaee**, *University of Central Florida, Orlando, FL, United States*, **Hyoung Jin Cho**, *Univ. Of Central Florida, Orlando, FL, United States*

**11:03am A passive Stokes flow rectifier for Newtonian fluids**

Technical Presentation. IMECE2018-89658

**Aryan Mehboudi, Junghoon Yeom**, *Michigan State University, East Lansing, MI, United States*

**11:24am Spray Performance of Alternative Jet Fuel Based Nanofuels at High-Ambient Conditions**

Technical Paper Publication. IMECE2018-87387

**Mohamed Soltan, Buthaina Al Abdulla, Al Reem Al-Dosari**, *Texas A&M University at Qatar, Doha, Qatar*, **Kumaran Kannaiyan**, *Texas A & M University at Qatar, Doha, Qatar*, **Reza Sadr**, *Texas A&M University, College Station, TX, United States*

## 9-18 YOUNG ENGINEERS PAPER (YEP) CONTEST

### 9-18-1 Young Engineers Paper (YEP) Contest

**Third Floor, David L. Lawrence Convention Center, Room 325 10:00am - 11:45am**

Session Chair: **B. Terry Beck**, *Kansas State Univ, Manhattan, KS, United States*

Session Co-Chair: **D.Keith Walters**, *University of Oklahoma, Norman, OK, United States*

**10:00am Downwind Two-Bladed Wind Turbine Aerodynamic Performance Evaluation Implementing Actuator Line Model**

Technical Paper Publication. IMECE2018-86549

**Sebastian Henao**, *National University of Colombia, Marinilla, Antioquia, Colombia*, **Aldo G. Benavides**, *National University of Colombia, Medellin, Antioquia, Colombia*, **Omar D. López**, *Los Andes University, Bogota, Cundinamarca, Colombia*

**10:21am The Effect of a Spanwise Body Force on Skin-Friction Reduction and its Connections to Low-Drag States in Turbulent Flow**

Technical Paper Publication. IMECE2018-86610

**Jae Sung Park, Thomas Hafner**, *University of Nebraska-Lincoln, Lincoln, NE, United States*

**10:42am Pulsatory Mixing of Laminar Flow Using Bubble-Driven Micro-Pumps**

Technical Paper Publication. IMECE2018-86937

**Brandon Hayes, Austin Hayes, Matthew Rolleston, James Krisher, Alexander Ferreira**, *Rochester Institute of Technology, Rochester, NY, United States*

**11:03am The Impact of Adding a Labyrinth Surface to an Optimal Helical Seal Design**

Technical Paper Publication. IMECE2018-87089

**Wisher Paudel**, *University of Virginia, Charlottesville, VA, United States*, **Cori Watson**, *University of Virginia, Charlottesville, VA, United States*, **Houston G. Wood**, *University of Virginia, Charlottesville, VA, United States*

**11:24am Comparing Fish-Inspired Ram Filter to Conventional Membrane Filter**

Technical Paper Publication. IMECE2018-88797

**Lauren Marshall, Adam Schroeder**, *University of Toledo, Toledo, OH, United States*, **Brian Trease**, *The University of Toledo, Toledo, OH, United States*

## 9-3 25TH SYMPOSIUM ON FLUID MECHANICS AND RHEOLOGY OF NONLINEAR MATERIALS AND COMPLEX FLUIDS

### 9-3-2 Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids - II

**Third Floor, David L. Lawrence Convention Center, Room 319 1:45pm - 3:30pm**

Session Chair: **Mhamed Boutaous**, *Universite de Lyon, Villeurbanne, France*

Session Co-Chair: **Dennis A. Siginer**, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

**1:45pm Numerical Modeling of Phan-Thien-Tanner Viscoelastic Fluid Flow Through a Square Cross-Section Duct: Heat Transfer Enhancement due to Shear-Thinning Effects**

Technical Paper Publication. IMECE2018-87568

**Mhamed Boutaous**, *Universite de Lyon, Villeurbanne, France*, **Fouad Hagani, Shihe Xin, Ronnie Knikker**, *INSA de Lyon, Villeurbanne, France*, **Dennis A. Siginer**, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*

**2:06pm Resonance in Laminar Pipe Flow of Non-Linear Viscoelastic Fluids**

**Technical Paper Publication.** IMECE2018-87973

*Mario Letelier, University of Santiago of Chile, Santiago, OO, Chile, Dennis A. Siginer, Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile, Diego Almen-dra, Juan Stockle, Universidad de Santiago de Chile, Santiago, Chile*

**2:27pm Rheology of non-dilute suspensions of de-formable particles in Newtonian solvents under Large Amplitude Oscillatory Shear (LAOS)**

**Technical Presentation.** IMECE2018-89194

*Christoph Kammer, University of Pennsylvania, Philadelphia, PA 19104-6315, PA, United States, Pedro Ponte Castañeda, University of Pennsylvania, Philadelphia, PA, United States*

**2:48pm Rheological Characteristics of Surfactant-Based Fluids: A Comprehensive Study**

**Technical Paper Publication.** IMECE2018-86044

*Ahmed Kamel, University of Texas of the Permian Basin, Odes-sa, TX, United States*

**3:09pm Study on the Numerical Analysis of In-Line Type Subsea Separator for Liquid-Liquid Mixture Flow**

**Technical Paper Publication.** IMECE2018-87301

*Young Ju Kim, Korea Institute of Geoscience and Mineral Re-sources, Pohang-Si, Gyeongsangbuk-Do, Korea (Republic), Namsub Woo, Hyunji Kim, KIGAM(Korea Institute of Geosci-ence and Mineral Resources), Pohang-si, Gyeongsangbuk-do, Korea (Republic), Sangmok Han, Korea Institute of Geoscience and Mineral Resources, Pohang, Korea (Republic), Jih Ha KIGAM(Korea Institute of Geoscience and Mineral Resources), Pohang-si, Gyeongsangbuk-do, Korea (Republic), Sunchul Huh, Gyeongsang National University, Tongyeong-si, Gyeong-sangnam-do., Korea (Republic)*

**9-5 SYMPOSIUM ON CFD APPLICATIONS FOR OPTI-MIZATION AND CONTROLS**

**9-5-2 CFD Applications for Flow Optimization and Con-trol - II**

**Third Floor, David L. Lawrence Convention Center, Room 323 1:45pm - 3:30pm**

Session Chair: **Zhongquan Charlie Zheng, University of Kansas, Lawrence, KS, United States**

Session Co-Chair: **Ning Zhang, McNeese State University, Lake Charles, LA, United States, Philipp Epple, Coburg University of Applied Sciences, Coburg, Bavaria, Germany**

**1:45pm Optimization of Curved Spacer Prototype De-sign for Flow Improvement in Centrifugal Pump Impeller**

**Technical Paper Publication.** IMECE2018-87075

*Munther Hermez, Lawrence Technological University, South-field, MI, United States, Badih Jawad, Lawrence Technological University, Dearborn Heights, MI, United States, Liping Liu, Sa-bah Abro, Lawrence Technological University, Southfield, MI, United States*

**2:06pm Influence of Blade Shape Geometry on Very Low Specific Speed Centrifugal Pump Performance**

**Technical Paper Publication.** IMECE2018-87119

*muhamed elsayed albadawi, Ihab Adam, Sherif Haddara, Ahmed Elsherif, alexandria university, alexandria, alexandria, Egypt*

**2:27pm Efficiency Variation on a 4-Stage Low Speed Research Compressor With a Redesigned Cantilevered Stator**

**Technical Paper Publication.** IMECE2018-87166

*Zhenzhou Ju, Shanghai Jiaotong university, Shanghai, China, Jinfang Teng, Shanghai Jiao Tong University, Shanghai, China, Lin Fan, Yongjian Zhong, AECC Commercial Aircraft Engine Company, ShangHai, China, Xiao-Qing Qiang, Shanghai Jiao Tong University, Shanghai, China*

**2:48pm Surrogate Model Based Optimization for Chevron Foil Thrust Bearing**

**Technical Presentation.** IMECE2018-87778

*Gen Fu, Alexandrina Untaroiu, Virginia Tech, Blacksburg, VA, United States*

**3:09pm “Comparison of Experimental, Thermoelas-tohydrodynamic (TEHD) and Thermal, Non-Deforming Com-putational Fluid Dynamics (CFD) Results for Thrust Bearings: Part II”**

**Technical Paper Publication.** IMECE2018-87798

*Xin Deng, University of Virginia, Charlottesville, VA, United States, Cori Watson, Unviersity of Virginia, Charlottesville, VA, United States, Minhui He, Houston G. Wood, Roger Fitro, University of Virginia, Charlottesville, VA, United States*

**9-9 MICROFLUIDICS 2018 - FLUID ENGINEERING IN MICRO- AND NANOSYSTEMS**

**9-9-2 Droplet Microfluidics**

**Third Floor, David L. Lawrence Convention Center, Room 324 1:45pm - 3:30pm**

Session Chair: **Hongwei Sun, University Of Massachusetts Lowell, Lowell, MA, United States**

**1:45pm Experimental Investigation on Newtonian Drop Formation in Different Continuous Phase Fluids**

**Technical Paper Publication.** IMECE2018-86602

*Ashkan Nazari, Virginia Tech, Blacksburg, VA, United States, Arash Nazari, K.N. Toosi University of Technology, Tehran, Iran*

**2:06pm Droplet Mixing Based on Thermotaxis**

**Technical Presentation.** IMECE2018-87730

*Alireza Karbalaee, Ranganathan Kumar, University of Central Florida, Orlando, FL, United States, Hyoung Jin Cho, Univ. Of Central Florida, Orlando, FL, United States*

**2:27pm Forced Wetting of Liquids Using Ultrasonic Surface Vibration**

**Technical Paper Publication.** IMECE2018-87832

*Matthew Trapuzzano, University of South Florida, Tampa, FL, United States, Nathan Crane, Univ Of South Florida, Tampa, FL, United States, Rasim Guldiken, Andres Tejada-Martinez, Uni-versity of South Florida, Tampa, FL, United States*

**Draft Program**

**2:48pm Preliminary Investigation of the Effect of Dielectrophoresis on Colloidal Transport and Deposition in Evaporating Droplets**

**Technical Paper Publication.** IMECE2018-88054

*Xi Li, Rochester Institute of Technology / Mech. Eng., Rochester, NY, United States, Kara L. Maki, Michael Schertzer, Rochester Institute of Technology, Rochester, NY, United States*

**3:09pm Study of gas-liquid droplet microfluidics in confined flow focusing geometries for enhanced droplet generation**

**Technical Presentation.** IMECE2018-89904

*Pooyan Tirandazi, Julian D. Arroyo, Dac Duc Ho, Carlos H. Hidrovo, Northeastern University, Boston, MA, United States*

## **9-11 14TH FORUM ON RECENT DEVELOPMENTS IN MULTIPHASE FLOW**

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### **9-11-1 Computational Modeling of Multiphase Flows**

**Third Floor, David L. Lawrence Convention Center, Room 325 1:45pm - 3:30pm**

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Session Chair: **Joseph Katz**, Johns Hopkins University, Baltimore, MD, United States

Session Co-Chair: **Marianne Francois**, Los Alamos National Laboratory, Los Alamos, NM, United States

**1:45pm An Accurate Unstructured Finite Volume Discrete Boltzmann Method**

**Technical Paper Publication.** IMECE2018-87136

*Leitao Chen, Laura Schaefer, Rice University, Houston, TX, United States, Xiaofeng Cao, University of Delaware, Newark, DE, United States*

**2:06pm A Hyperbolicity Analysis of the 1991 OLGAA's Model for Isothermal Flow**

**Technical Paper Publication.** IMECE2018-87513

*Carina N. Sondermann, Federal University of Rio De Janeiro, Rio De Janeiro, Brazil, Raphael V. Freitas, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil, Rodrigo Patricio, Federal University of Rio De Janeiro, Rio De Janeiro, Brazil, Aline B. Figueiredo, Federal University of Rio de Janeiro (UFRJ/COPPE), Rio de Janeiro, Rio de Janeiro, Brazil, Gustavo C. R. Bodstein, Federal University of Rio De Janeiro, Rio De Janeiro, OO, Brazil, Felipe B. De F. Rachid, Fluminense Federal University (PGMEC/UFF), Rio De Janeiro, Brazil, Renan Martins Baptista, Petrobras, Rio de Janeiro, Brazil*

**2:27pm Numerical Study of Two-Phase Flow in a Horizontal Pipeline Using an Unconditionally Hyperbolic Two-Fluid Model**

**Technical Paper Publication.** IMECE2018-87571

*Raphael V. Freitas, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Rio de Janeiro, Brazil, Carina N. Sondermann, Rodrigo Patricio, Federal University of Rio De Janeiro, Rio De Janeiro, Brazil, Aline B. Figueiredo, Federal University of Rio de Janeiro (UFRJ/COPPE), Rio de Janeiro, Rio de Janeiro, Brazil, Gustavo C. R. Bodstein, Federal University of Rio De Janeiro, Rio De Janeiro, OO, Brazil, Felipe B. De F. Rachid, Fluminense Federal University (PGMEC/UFF), Rio De Janeiro, Brazil, Renan Martins Baptista, Petrobras, Rio de Janeiro, Brazil*

**2:48pm Interfacial Mobility Calculations from Random Atomistic Walks**

**Technical Presentation.** IMECE2018-87957

*Paul Barclay, Jennifer Lukes, University of Pennsylvania, Philadelphia, PA, United States*

**3:09pm Investigation of Power-law Shear Thinning Fluid Wicking in Capillary Channels by Two-Phase Direct Numerical Simulation with Volume-of-Fluid (VOF) Method**

**Technical Presentation.** IMECE2018-89580

*An Fu, Nikhil Kumar Palakurthi, University of Cincinnati, Cincinnati, OH, United States, James Comer, The Procter & Gamble Company, Cincinnati, OH, United States, Milind Jog, university of Cincinnati, Cincinnati, OH, United States*

## **9-3 25TH SYMPOSIUM ON FLUID MECHANICS AND RHEOLOGY OF NONLINEAR MATERIALS AND COMPLEX FLUIDS**

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### **9-3-3 Fluid Mechanics and Rheology of Nonlinear Materials and Complex Fluids - III**

**Third Floor, David L. Lawrence Convention Center, Room 319 3:45pm - 5:30pm**

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Session Chair: **Mhamed Boutaous**, Universite de Lyon, Villeurbanne, France

Session Co-Chair: **Dennis A. Siginer**, Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile

**3:45pm The Flow Structure of Annular Yield-Pseudoplastic Non-Newtonian Flows**

**Technical Presentation.** IMECE2018-89383

*Khaled J. Hammad, Central Connecticut State University, Simsbury, CT, United States*

**4:06pm The Effect of the Fluid Film Variable Viscosity on the Hydrostatic Thrust Spherical Bearing Performance in the Presence of Centripetal Inertia and Surface Roughness: Part 2 - Recessed Fitted Bearing**

Technical Paper Publication. IMECE2018-86029

*Ahmad W.Y. Elescandarany, Alex Univ, Alexandria, Egypt*

**4:27pm Herschel-Bulkley Fluid Flow Characteristics in a Duct With an Obstacle**

Technical Paper Publication. IMECE2018-87092

*Nariman Ashrafi, Iau, Tehran, Iran, Ali Sadeghi, Armin Chegini, SRBIAU, tehran, Iran, mehdi shafahi, Iau, tehran, Iran*

**4:48pm "Mixing Enhancement in a Novel Type of "Split and Recombine" Static Mixer"**

Technical Paper Publication. IMECE2018-88030

*Charbel Habchi, Notre Dame University - Louaize, ZOUK MOS-BEH, Lebanon, Thierry Lemenand, University of Angers, Angers, France, Fouad Azizi, American University of Beirut, Beirut, Lebanon*

**5:09pm Viscoplastic Fluid Flow Between Parallel Plates With Triangular Obstacles**

Technical Paper Publication. IMECE2018-87105

*Nariman Ashrafi, Iau, Tehran, Iran, Ali Sadeghi, Armin Chegini, SRBIAU, tehran, Iran*

## **9-5 SYMPOSIUM ON CFD APPLICATIONS FOR OPTIMIZATION AND CONTROLS**

**9-5-3 CFD Applications for Flow Optimization and Control - III**

Third Floor, David L. Lawrence Convention Center, Room 323 3:45pm - 5:30pm

Session Chair: **Zhongquan Charlie Zheng**, *University of Kansas, Lawrence, KS, United States*

Session Co-Chair: **Ning Zhang**, *McNeese State University, Lake Charles, LA, United States*, **Philipp Epple**, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

**3:45pm LES and Hybrid RANS-LES Simulation of a Pulsating Channel Flow**

Technical Paper Publication. IMECE2018-87990

*Tausif Jamal, University of Oklahoma, Norman, OK, United States, Huiyu Wang, The University of Oklahoma, Norman, OK, United States, D.Keith Walters, University of Oklahoma, Norman, OK, United States*

**4:06pm Transient Analysis of Air Flow in a Channel for Unconventional Radiator**

Technical Paper Publication. IMECE2018-88327

*Wahidul Islam, Jobaidur Khan, University at Buffalo, Buffalo, NY, United States*

**4:27pm On Fine Tuning the SST K- $\omega$  Turbulence Model Closure Coefficients for Improved Prediction of Automotive External Flows**

Technical Paper Publication. IMECE2018-88328

*Chunhui Zhang, University of North Carolina at Charlotte, Charlotte, NC, United States, Mesbah Uddin, North Carolina Motor-sports and Automotive Research Center, Charlotte, NC, United States, Christian Selent, University of North Carolina at Charlotte, Charlotte, NC, United States*

**4:48pm Experimental Analysis of Air Flow in a Channel for Unconventional Radiator**

Technical Paper Publication. IMECE2018-88332

*Saad Salman, Rishabh Sharma, Kanishk Suri, Zeshan Khetani, University at Buffalo, Buffalo, NY, United States, Muhammad Taha Junaidy, University At Buffalo SUNY, Buffalo, NY, United States, Jonatan Meza, Jobaidur Khan, University at Buffalo, Buffalo, NY, United States*

**5:06pm Effect of double noise barriers on highway pollutant dispersion under various atmospheric boundary conditions**

Technical Presentation. IMECE2018-88444

*Liyuan Gong, Xiuling Wang, Purdue University Northwest, Hammond, IN, United States*

## **9-9 MICROFLUIDICS 2018 - FLUID ENGINEERING IN MICRO- AND NANOSYSTEMS**

**9-9-3 Fundamentals and Applications of Microfluidics**

Third Floor, David L. Lawrence Convention Center, Room 324 3:45pm - 5:30pm

Session Chair: **Nazmul Islam**, *Univ of Texas Rio Grande Valley, Edinburg, TX, United States*

Session Co-Chair: **Jacek Wrobel**, *poltechresearch.com, Great Falls, VA, United States*

**3:45pm Transition From Planar Stratified Flow in Converging Microchannels**

Technical Paper Publication. IMECE2018-86289

*Zachary Lamberty, Minseo Park, Nelson Macken, Swarthmore College, Swarthmore, PA, United States, Adam Melvin, Louisiana State University, Baton Rouge, LA, United States*

**4:06pm** Experimental Study of the Suspension Flow Past Confined Low-Aspect-Ratio Cylinder Arranged Micro-channels

Technical Paper Publication. IMECE2018-86980

*Xiao Cheng, Zhenhai Pan, Huiying Wu, Shanghai Jiao Tong University, Shanghai, China*

**4:27pm** Degradation of Hydrophobic Surface Coatings Under Water Exposure

Technical Paper Publication. IMECE2018-87860

*Matthew Trapuzzano, Rasim Guldiken, Andres Tejada-Martinez, University of South Florida, Tampa, FL, United States, Nathan Crane, Univ Of South Florida, Tampa, FL, United States*

**4:48pm** A Quick and Easy Fabrication Method for Microfluidics Using Solid Ink Printing

Technical Presentation. IMECE2018-89139

*Sara Hopper, Endicott College, Beverly, MA, United States, Haipeng Zhang, Sangjin Ryu, University of Nebraska-Lincoln, Lincoln, NE, United States*

**5:09pm** Micropattern-controlled wicking enhancement in hierarchical micro/nanostructures

Technical Presentation. IMECE2018-89192

*Arif Rokoni, Dong-Ook Kim, Drexel University, Philadelphia, PA, United States, Ying Sun, Mechanical Engineering, Drexel University, Philadelphia, PA, United States*

## **9-11 14TH FORUM ON RECENT DEVELOPMENTS IN MULTIPHASE FLOW**

**9-11-2 Experimental Characterization of Complex Multiphase Flows**

**Third Floor, David L. Lawrence Convention Center, Room 325 3:45pm - 5:30pm**

Session Chair: **Marianne Francois**, *Los Alamos National Laboratory, Los Alamos, NM, United States*

Session Co-Chair: **Mark R Duignan**, *Savannah River National Laboratory, Aiken, SC, United States*

**3:45pm** Parametric Study and Improvement of Phase Separation in Intermediate Headers of Microchannel Condensers

Technical Paper Publication. IMECE2018-88438

*Jun Li, University of Illinois At Urbana-Champaign, Urbana, IL, United States, Pega Hrnjak, Univ Of Illinois, Urbana, IL, United States*

**4:06pm** Experimental Study of Chamber Volume Effect on Bubble Formation From Orifice Plates Submerged in Water

Technical Paper Publication. IMECE2018-87652

*Omkar Gokhale, Milind Jog, Raj M. Manglik, University of Cincinnati, Cincinnati, OH, United States*

**4:27pm** Using Experimental Fluid Dynamics and Computational Fluid Dynamics for Evaluating Periodic Mixing

Technical Paper Publication. IMECE2018-88531

*Judith Bamberger, Leonard Pease, Kurtis Recknagle, Carl Enderlin, Michael Minette, Pacific Northwest National Laboratory, Richland, WA, United States*

**4:48pm** Experimental Analysis of Two Phase Flow in a Quasi-Homogeneous Porous Inclined Hele-Shaw Cell

Technical Presentation. IMECE2018-88633

*Luis Luviano-Ortiz, University of Guanajuato, Salamanca/Guanajuato, Guanajuato, Mexico, Gustavo Guerrero-Arellano, University of Guanajuato, Santa Cruz De Juventino Rosas, Guanajuato, Mexico, Nubia Sanchez, University of Guanajuato, Salamanca, Guanajuato, Mexico, Eduardo Ramos, Universidad Nacional Autónoma de México, Temixco, Morelos, Mexico, Abel Hernandez-Guerrero, University of Guanajuato, Salamanca, Guanajuato, Guanajuato, Mexico*

**5:09pm** Understanding transport of microgels through a constrictive channel

Technical Presentation. IMECE2018-89990

*Shuaijun Li, Florian Crepin, Alimohammad Anbari, Jing Fan, The City College of New York, New York, NY, United States*

## **WEDNESDAY, NOVEMBER, 14**

### **9-5 SYMPOSIUM ON CFD APPLICATIONS FOR OPTIMIZATION AND CONTROLS**

**9-5-4 CFD Applications for Flow Optimization and Control - IV**

**Third Floor, David L. Lawrence Convention Center, Room 326 10:00am - 11:45am**

Session Chair: **Zhongquan Chen**, *University of Kansas, Lawrence, KS, United States*

Session Co-Chair: **Ning Zhang**, *McNeese State University, Lake Charles, LA, United States, Philipp Epple, Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

**10:00am** Numerical Analysis of Breakwaters Turbulence Under Coastal Wave Actions

Technical Paper Publication. IMECE2018-88613

*Huanrong Ouyang, Joshua Hantz, Tam Nguyen, McNeese State University, Lake Charles, LA, United States, Amy Harrington, McNeese State University, Winnie, TX, United States, Ning Zhang, McNeese State University, Lake Charles, LA, United States*

**10:21am** New Design Method for Spiral Casings Considering the Properties of the Impeller and Spiral Casing at Design and Off-Design Conditions and Numerical Verification With CFD

Technical Paper Publication. IMECE2018-88673

*Philipp Epple, Coburg University of Applied Sciences, Coburg, Bavaria, Germany, Manuel Fritsche, Coburg University, Coburg, Germany, Michael Steppert, Michael Steber, Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

**10:42am** The Impact of the Gas Temperature and of the Relative Humidity on the Performance of Fans Operating in Drying Plants

Technical Paper Publication. IMECE2018-88674

*Manuel Fritsche, Coburg University, Coburg, Germany, Philipp Epple, Coburg University of Applied Sciences, Coburg, Bavaria, Germany, Antonio Delgado, Friedrich-Alexander University of Erlangen-Nuernberg, Erlangen, Germany*

**11:03am** Numerical investigation to the influence of upstream components on the pressure fluctuation in draft tube of Francis turbine  
**Technical Presentation.** IMECE2018-88818  
*Wen-Tao Su, Harbin Institute of Technology, Harbin, Heilongjiang, China, You-Ning Xu, Shenyang Institute of Engineering, Shenyang, Liaoning, China*

## **9-11 14TH FORUM ON RECENT DEVELOPMENTS IN MULTIPHASE FLOW**

### **9-11-3 Simulation of Multiphase Flows in Pumps and Complex Systems**

**Third Floor, David L. Lawrence Convention Center, Room 327 10:00am - 11:45am**

Session Chair: **Robert Kunz, Penn State University, University Park, PA, United States**  
Session Co-Chair: **Joseph Katz, Johns Hopkins University, Baltimore, MD, United States**

**10:00am** Large Eddy Simulation of Ventilated Pump-Turbine for Wastewater Treatment  
**Technical Paper Publication.** IMECE2018-86330  
*Cosan Daskiran, Bashar Attiya, Muhannad Altimemy, I-Han Liu, Alparslan Oztekin, Lehigh University, Bethlehem, PA, United States*

**10:21am** A Reduced-Order Model for Predicting the Performance of a Liquid Ring Vacuum Pump  
**Technical Paper Publication.** IMECE2018-86310  
*Irsha Pardeshi, Ashutosh Pandey, Tori Smith, Purdue University, West Lafayette, IN, United States*

**10:42am** Effect of Particle Parameters on Erosion Wear and Performance of Screw Centrifugal Pump  
**Technical Paper Publication.** IMECE2018-88586  
*zhengjing shen, WULI CHU, Northwestern Polytechnical University, xi'an, China*

**11:03am** Numerical and Experimental Investigation of the Manufacturing Process of Ball Bearings Focusing on Enhancing the Aesthetics of the Outer Surface  
**Technical Presentation.** IMECE2018-89614  
*Abdullah Alsairafi, Stefan Moldovan, Youngstown State University, Youngstown, OH, United States*

## **9-13 27TH SYMPOSIUM ON INDUSTRIAL FLOWS**

### **9-13-1 Industrial Flows - I**

**Room 328 10:00am - 11:45am**

Session Chair: **Alexandrina Untaroiu, Virginia Tech, Blacksburg, VA, United States**  
Session Co-Chair: **George Chamoun, Eastman Kodak, Gray, TN, United States, Kevin Anderson, California State Polytech Univ, Pomona, CA, United States**

**10:00am** Full Scale Testing of Pulse Jet Mixer Operating Control  
**Technical Paper Publication.** IMECE2018-87866  
*Leolein Moualeu, Aaron Wand, Klemme Herman, Michaela Trinidad, Bethany Springer, Michael Hall, Bechtel National Inc., Richland, WA, United States, Nathan McAdams, Bechtel National Inc., Reston, VA, United States, Langdon Holton, US Department of Energy, Richland, WA, United States*

**10:42am** Numerical Investigations of a Rotating Wire-Wrapped Cylinder  
**Technical Paper Publication.** IMECE2018-86672  
*Assma Begum, California State Univ., Long Beach, Long Beach, CA, United States, Komal Gada, California State University Long Beach, Long Beach, CA, United States, Hamid Rahai, California St Univ-long Beach, Long Beach, CA, United States*

**11:03am** The Effect of PTFE Membrane Properties on Vacuum Membrane Distillation Module Performance  
**Technical Paper Publication.** IMECE2018-86327  
*Mustafa Usta, Robert M. Krysko, Ali E. Anqi, Ahmed M. Alsh-wairekh, Alparslan Oztekin, Lehigh University, Bethlehem, PA, United States*

**11:24am** Assessment of Different Turbulence Models on Simulations of Confined Jets in a Crossflow at Supercritical Pressure  
**Technical Paper Publication.** IMECE2018-87894  
*Saeid Janani, CEERS/CSULB, Long Beach, CA, United States, Komal Gada, California State University Long Beach, Long Beach, CA, United States, Hamid Rahai, California St Univ-long Beach, Long Beach, CA, United States, Farhad Davoudzadeh, Air Force Research Laboratory, Lancaster, CA, United States*

## **9-8 KIRTI (KARMAN) GHIA CELEBRATION OF LIFE SYMPOSIUM**

### **9-8-1 Kirti Ghia Celebration of Life - I**

**Third Floor, David L. Lawrence Convention Center, Room 326 1:45pm - 3:30pm**

Session Chair: **Surya Vanka, University of Illinois, Champaign, IL, United States**  
Session Co-Chair: **S.A. Sherif, University of Florida, Gainesville, FL, United States**

**1:45pm** Flow in Driven Cavities: Building on Karman Ghia's Legacy  
**Technical Presentation.** IMECE2018-89029  
*Surya Vanka, University of Illinois, Champaign, IL, United States*

**2:06pm** In Memory of Prof. Kirti Ghia: A Tribute to Life-Long Learning and Evolution  
**Technical Presentation.** IMECE2018-90010  
*Ameer G, Dept. of Homeland Security, Arlington, Uruguay*

**2:27pm** LOW-EMISSION COMBUSTION RESEARCH AT NASA GLENN  
**Technical Presentation.** IMECE2018-89025  
*Dhanireddy Reddy, NASA Glenn Research Center, Cleveland, OH, United States*

**2:48pm** **GlennICE: A Next Generation Computational Ice Accretion Solver**  
Technical Presentation. IMECE2018-89142  
*Christopher Porter, NASA Glenn Research Center, Cleveland, OH, United States*

**9-11 14TH FORUM ON RECENT DEVELOPMENTS IN MULTIPHASE FLOW**

**9-11-4 Modeling of Slug Flows, Separators and Shocks**

**Third Floor, David L. Lawrence Convention Center, Room 327 1:45pm - 3:30pm**

Session Chair: **Mark R Duignan**, *Savannah River National Laboratory, Aiken, SC, United States*

Session Co-Chair: **Robert Kunz**, *Penn State University, University Park, PA, United States*

**1:45pm** **The Investigation of the Kinetic Energy of Slug in a Horizontal Channel Using VOF Method**  
Technical Paper Publication. IMECE2018-87108

*Nariman Ashrafi, Iau, Tehran, Iran, Mohammad Reza Ansari, Tarbiat Modares University, tehran, Iran, Armin Chegini, Ali Sadeghi, SRBIAU, tehran, Iran*

**2:06pm** **Analysis of Two-Phase Flow Slug Regime With Engineering Approach**  
Technical Paper Publication. IMECE2018-87118

*Nariman Ashrafi, Iau, Tehran, Iran, Armin Chegini, Ali Sadeghi, SRBIAU, tehran, Iran*

**2:27pm** **Mechanistic Modeling of Dynamic Zero-Net Liquid Holdup (ZNLH) in Gas-Liquid Cylindrical Cyclone (GLC-CAC) Separator**

Technical Paper Publication. IMECE2018-88481  
*Srinivas Swaroop Kolla, Megharaj Praneeth Karpurapu, Ram Mohan, The University of Tulsa, Tulsa, OK, United States, ova-dia Shoham, University of Tulsa, TULSA, OK, United States*

**2:48pm** **On the Aspects of a Convergent Shock Wave Impinging a Perturbed Density Interface**  
Technical Paper Publication. IMECE2018-88098

*Erik Proano, Bertrand Rollin, Dongeun Seo, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

**9-13 27TH SYMPOSIUM ON INDUSTRIAL FLOWS**

**9-13-2 Industrial Flows - II**

**Room 328 1:45pm - 3:30pm**

Session Chair: **Kevin Anderson**, *California State Polytech Univ, Pomona, CA, United States*

Session Co-Chair: **Alexandrina Untaroiu**, *Virginia Tech, Blacksburg, VA, United States, Ivaylo Nedyalkov, University of New Hampshire, Durham, NH, United States*

**1:45pm** **Pressure Fluctuation Mitigation in a Francis Turbine With Water Injection: Computational Study**  
Technical Paper Publication. IMECE2018-86333  
*Muhannad Altimemy, Cosan Daskiran, Bashar Attiya, I-Han Liu, Alparslan Oztekin, Lehigh University, Bethlehem, PA, United States*

**2:06pm** **Development of the Pneumatic Non-Contact Holder**

Technical Paper Publication. IMECE2018-86618  
*Tetsuhiro Tsukiji, Sophia Univ, Tokyo 102 8554, Tokyo, Japan, Ryoosuke Kondo, Sophia University, Tokorozawa-shi, Saitama, Japan*

**2:27pm** **Experimental Characterization of Particle-Laden Air Flow Across Horizontal Pipe Junctions**  
Technical Paper Publication. IMECE2018-87833

*Tariq Khan, Petroleum Institute, Abu Dhabi, Abu Dhabi, United Arab Emir., Mohamed Alshehhi, The Petroleum Institute, Abu Dhabi, Abu Dhabi, United Arab Emir., Xu Rumin, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir., Saqib Salam, The Petroleum Institute., Abu Dhabi, Abu Dhabi, United Arab Emir.*

**2:48pm** **Numerical Analysis on the Hydraulic Performance of the Auxiliary Impeller in Large Capacity Canned-Motor Pump**

Technical Paper Publication. IMECE2018-87285  
*Shengde Wang, Zhenqiang Yao, Hong Shen, Guohu Luo, Shanghai Jiao Tong University, Shanghai, China*

**3:09pm** **An Assessment of Health Hazards in Valves for Gaseous Oxygen Service Sources and Preventive Measures**

Technical Paper Publication. IMECE2018-86018  
*Anil Kumar, Independent Author, Pune, Select State/Province, India, Younus Sheikh, Army Institute Of Technology, Savitribai Phule Pune University, Pune, Select State/Province, India*

**9-6 PANEL: CFD/EFD CHOICE? - A DILEMMA FOR INDUSTRIES**

**9-6-1 Computational or Experimental Fluid Dynamics? - A Dilemma for Industries**

**Third Floor, David L. Lawrence Convention Center, Room 327 3:45pm - 5:30pm**

Session Chair: **Philipp Epple**, *Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

Session Co-Chair: **Emma Frosina**, *University of Naples, Naples, Italy*

**3:45pm** **CFD and EFD in the design process of fans and blowers**

Panel Presentation. IMECE2018-88829  
*Philipp Epple, Coburg University of Applied Sciences, Coburg, Bavaria, Germany*

**4:06pm** **How Do You Know It's Accurate? An Insider's Guide to CFD Validation and Verification**

Panel Presentation. IMECE2018-88844  
*William Kulp, ANSYS, Canonsburg, PA, United States*

**4:27pm Prediction of Both Aeration and Cavitation in Axial Piston Pumps Using a 3D-CFD Numerical Approach**

**Panel Presentation. IMECE2018-88969**

*Emma Frosina, University of Naples, Naples, Italy*

**4:48pm Evaluating Periodic Mixing with Experimental and Computational Fluid Dynamics**

**Panel Presentation. IMECE2018-89407**

*Judith Bamberger, Pacific Northwest National Laboratory, Richland, WA, United States*

**9-8 KIRTI (KARMAN) GHIA CELEBRATION OF LIFE SYMPOSIUM**

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**9-8-2 Kirti Ghia Celebration of Life - II**

**Third Floor, David L. Lawrence Convention Center, Room 326 3:45pm - 5:30pm**

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Session Chair: **Surya Vanka**, *University of Illinois, Champaign, IL, United States*

Session Co-Chair: **Mark R Duignan**, *Savannah River National Laboratory, Aiken, SC, United States*

**3:45pm CFD for the Development of Bio-Inspired Unmanned Vehicles**

**Technical Presentation. IMECE2018-88982**

*Ravi Ramamurti, Jason Geder, Naval Research Laboratory, Washington, DC, United States*

**4:06pm Flow and Heat Transfer Past Turbine Airfoils**

**Technical Presentation. IMECE2018-89391**

*Sumanta Acharya, Yousef Kanani, Illinois Institute of Technology, Chicago, IL, United States*

**4:27pm Multiphase Boundary Layer Models for Aircraft Icing Simulation**

**Technical Presentation. IMECE2018-89605**

*Alric Rothmayer, Iowa State University, Ames, IA, United States*

**4:48pm Automated Hybrid Volume Mesh Generation with Adaptive Surface/Volume Refinement**

**Technical Presentation. IMECE2018-89624**

*John Steinbrenner, Steve Karman, Jr., Nick Wyman, Pointwise, Inc., Fort Worth, TX, United States*

**5:09pm Utilization of The StreamVane for Boundary Layer Ingestion Testing**

**Technical Presentation. IMECE2018-89753**

*Mark Celestina, Julia Stephens, NASA Glenn Research Center, Cleveland, OH, United States*

**9-13 27TH SYMPOSIUM ON INDUSTRIAL FLOWS**

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**9-13-3 Industrial Flows - III**

**Room 328 3:45pm - 5:30pm**

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Session Chair: **George Chamoun**, *Eastman Kodak, Gray, TN, United States*

Session Co-Chair: **Kevin Anderson**, *California State Polytech Univ, Pomona, CA, United States*, **Nikhil Kumar Palakurthi**, *University of Cincinnati, Cincinnati, OH, United States*

**3:45pm Analyzing the Flow in Annular Gap With a Restrictor Mounted on Outer Cylinder**

**Technical Paper Publication. IMECE2018-87207**

*Guohu Luo, Zhenqiang Yao, Hong Shen, Shengde Wang, Shanghai Jiao Tong University, Shanghai, China*

**4:06pm Bench Scale Experimental Study of Slug Flow Phenomena Using PID Control**

**Technical Paper Publication. IMECE2018-88564**

*Derek Staal, Daniel Schmidt, Jeffery McClung, Mark Behl, Louisiana State University, Baton Rouge, LA, United States, Mayank Tyagi, Louisiana State Univ, Baton Rouge, LA, United States*

**4:27pm Pilot Scale Experimental Study of Slug Flow Phenomena Using PID Control**

**Technical Paper Publication. IMECE2018-88565**

*Daniel Schmidt, Jeffery McClung, Mark Behl, Derek Staal, Louisiana State University, Baton Rouge, LA, United States, Mayank Tyagi, Louisiana State Univ, Baton Rouge, LA, United States*

**4:48pm NUMERICAL SIMULATION AND ANALYSIS OF HEAT RECOVERY FOR MULTI-STAGE AIR COMPRESSORS**

**Technical Presentation. IMECE2018-89705**

*Yiming Ma, Yi Chu, FS-Elliott CN Co., Shanghai, Select State/Province, China, Rongxin Zhang, Brad Hayes, FS-Elliott LLC, Export, PA, United States, Xuyang Chi, FS-Elliott CN Co., Shanghai, Shanghai, China*

**Draft Program**

**THURSDAY, NOVEMBER, 15**

**9-12 4TH FORUM ON MULTIPHASE FLOW WITH BIO-APPLICATIONS**

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**9-12-1 Multiphase Flow with Bio-applications**

**Third Floor, David L. Lawrence Convention Center, Room 318 8:55am - 10:40am**

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Session Chair: **Ning Zhang**, *McNeese State University, Lake Charles, LA, United States*

**8:55am Multiphase Fluid Flow Modeling for Biomedical Application (Shirodhara)**

**Technical Presentation. IMECE2018-87432**

*Swathika M, Department of Applied Mechanics, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India, B. T. Kannan, Independent Trainer / Consultant, Chennai, Tamil Nadu, India, L Sugumar, Sukra Helitek Pvt Ltd, Chennai, Tamil Nadu, India, Lakshmana Rao. C, Department of Applied Mechanics, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India, Balasubramanian Venkatesh, Department of Engineering Design, Indian Institute of Technology Madras, Chennai, Tamil Nadu, India*

**9:16am Modelling of the Transport of Salinity and Organic Matters in Sabine Lake**

**Technical Presentation. IMECE2018-89896**

*Ning Zhang, McNeese State University, Lake Charles, LA, United States*

**9:37am** Interaction and coalescence on a pair of laser-induced bubbles

Technical Presentation. IMECE2018-89903

*Yiwei Wang, Hongchen Li, Jingzhu WANG, Institute of Mechanics, Chinese Academy of Sciences, Beijing, China*

## **9-14 SYMPOSIUM ON WIND TURBINES AERODYNAMICS AND CONTROL**

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### **9-14-1 Symposium on Wind Turbines Aerodynamics and Control**

**Third Floor, David L. Lawrence Convention Center, Room 319 8:55am - 10:40am**

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Session Chair: **Majid Rashidi**, *Cleveland State University, Pepper Pike, OH, United States*

**8:55am** Aerodynamic Shape Optimization of Diffuser Augmented Wind Turbine Shrouds Using Asynchronous Differential Evolution

Technical Paper Publication. IMECE2018-86820

*Stavros Leloudas, Georgios Lygidakis, Giorgos Strofylas, Ioannis Nikolos, Technical University of Crete, Chania, Greece*

**9:16am** The Impact of the Wind Power Plant on the Air Radar's Functioning

Technical Paper Publication. IMECE2018-86823

*Victorita Radulescu, University POLITEHNICA of Bucharest, Bucharest, Romania*

**9:37am** Genetic Algorithm-based Design of Airfoil for the Root Region of Small Wind Turbines and Performance Analysis With Gurney Flaps

Technical Paper Publication. IMECE2018-87327

*Mohammed Rafiuddin Ahmed, Krishnil R. Ram, The University of the South Pacific, Suva, Fiji, Bum-Suk Kim, Jeju National University, Jeju, Korea (Republic), Sunil P. Lal, Massey University, Palmerston, New Zealand*

**9:58am** Numerical Simulation on Aerodynamic Performance of Ram Air Turbine Based on Mixed Flow Field

Technical Paper Publication. IMECE2018-88304

*Xiangbo Zhang, Shuiting Ding, Fenzhu Ji, Farong Du, Beihang University, Beijing, China, Shengrong Guo, Nanjing Engineer Institute of Aircraft System Jincheng, Nanjing, China*

## **9-15 18TH INTERNATIONAL SYMPOSIUM ON MEASUREMENT AND MODELING OF ENVIRONMENTAL FLOWS**

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### **9-15-1 18th International Symposium on Measurement and Modeling of Environmental Flows**

**Third Floor, David L. Lawrence Convention Center, Room 323 8:55am - 10:40am**

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Session Chair: **S.A. Sherif**, *University of Florida, Gainesville, FL, United States*

Session Co-Chair: **Kashif Nawaz**, *Oak Ridge National Laboratory | ORNL, Oak Ridge, TN, United States*

**8:55am** PittPack: Open-Source FFT-Based Poisson's Equation Solver for Computing With Accelerators

Technical Paper Publication. IMECE2018-87697

*Jaber Javanshir Hasbestan, University of Pittsburgh, East Ridge, TN, United States, Inanc Senocak, University of Pittsburgh, Pittsburgh, PA, United States*

**9:16am** Front Dynamics in Miscible Displacement Flow in a Curved Pipe

Technical Paper Publication. IMECE2018-88449

*Mohammadreza Yavari, Majid Bazargan, Khaje Nassir Toosi university of technology, Tehran, Select State/Province, Iran, Elaheh Bagherizadeh, Stony Brook University, Stony Brook, NY, United States*

**9:37am** Effect of Wind Speed on Ventilation Flow Through a Two Dimensional Room Fitted With a Windcatcher

Technical Paper Publication. IMECE2018-88666

*Rahil Taghipour, Peter Abdo, University of Technology Sydney UTS, Sydney, Select State/Province, Australia, B. Phuoc Huynh, Univ Of Tech Sydney, Broadway Nsw 2007, Australia*

**9:58am** Large Eddy Simulation of Turbulent Freestream/Bed Interactions with Coupled Surface/Subsurface Momentum Balance

Technical Presentation. IMECE2018-89196

*Y.P. Lian, J.D. Dallmann, B.H. Sonin, K. R. Roche, A.I. Packman, Gregory Wagner, Northwestern University, Evanston, IL, United States*

**10:19am** Interference of Straight and Tapered Cylinder Pairs Near the First Critical Speed

Technical Presentation. IMECE2018-89883

*Rishav Risal, Srinivas V Veeravalli, Indian Institute of Technology Delhi, Delhi, India, Suhail Ahmad, Indian Institute of Technology Delhi, Hauz Khas, New Delhi, Delhi, India*

## **9-4 24TH SYMPOSIUM ON FUNDAMENTAL ISSUES AND PERSPECTIVES IN FLUID MECHANICS**

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### **9-4-1 Fundamentals and Basic Research**

**Third Floor, David L. Lawrence Convention Center, Room 318 10:50am - 12:35pm**

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Session Chair: **John Buchanan**, *UNNPP, Pittsburgh, PA, United States*

Session Co-Chair: **Wayne Strasser**, *Eastman Chemical Co, Kingsport, TN, United States*

**10:50am** "Extracting Substantial Free Energy From Static Ambient Potential Energy Using Distance, Time-Lapse Chaos, and Coriolis Principles"

Technical Paper Publication. IMECE2018-86128

*Jim Surjaatmadja, Halliburton, Duncan, OK, United States*

**11:11am** Liquid Sloshing in a Partially-Filled Enclosure due to Sudden Impact or Periodic Motion

Technical Presentation. IMECE2018-86724

*Bakhtier Farouk, Drexel University, MEM Dept, Philadelphia, PA, United States*

**11:32am**                      **The Reynolds Stress in Turbulence From an Alternate Perspective**  
Technical Paper Publication. IMECE2018-86870  
*Taewoo Lee, Arizona State Univ, Tempe, AZ, United States*

**11:53am**                      **Force Decomposition of Medium Reynolds Number Oscillating Flow Over a Submerged Sphere**  
Technical Paper Publication. IMECE2018-88187  
*Aibek Bekkulov, University of Texas Rio Grande Valley, Edinburg, TX, United States, Shehua Huang, Wuhan University, Wuhan, Hubei, China, Ben Xu, University of Texas Rio Grande Valley, Edinburg, TX, United States*

**12:14pm**                      **Effect Of Slip Length On Drag Reduction And Delayed Transition In Laminar Channel Flow**  
Technical Presentation. IMECE2018-89179  
*Ethan Davis, Jae Sung Park, University of Nebraska-Lincoln, Lincoln, NE, United States*

## **9-16 11TH FORUM ON FLUID MEASUREMENTS AND INSTRUMENTATION**

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### **9-16-1 Fluid Measurements and Instrumentation - I**

**Third Floor, David L. Lawrence Convention Center, Room 319      10:50am - 12:35pm**

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Session Chair: **Stamatios Pothos**, *TSI Incorporated, Shoreview, MN, United States*

**10:50am**                      **Digital processors? algorithms used in Laser Based Pointwise measurement techniques**  
Technical Presentation. IMECE2018-68877  
*Stamatios Pothos, Daniel Troolin, TSI Incorporated, Shoreview, MN, United States*

**11:11am**                      **Effect of Passive Green Wall Modules on Air Temperature and Humidity**  
Technical Paper Publication. IMECE2018-86963  
*Peter Abdo, University of Technology Sydney UTS, Sydney, Australia, B. Phuoc Huynh, Univ Of Tech Sydney, Broadway Nsw 2007, Australia*

**11:32am**                      **Volumetric Velocity and Sizing Using Imaging in Two Phase Flows**  
Technical Presentation. IMECE2018-87831  
*Daniel Troolin, Aaron Boomsma, Stamatios Pothos, Tsi Incorporated, Shoreview, MN, United States*

**11:53am**                      **Stereoscopic Particle Shadow Velocimetry**  
Technical Paper Publication. IMECE2018-88013  
*Jeff Harris, Christine Truong, Pennsylvania State University, State College, PA, United States, Michael McPhail, Mayo Clinic, Phoenix, AZ, United States, Arnie Fontaine, Pennsylvania State University, State College, PA, United States*

**12:14pm**                      **Settling Characteristics of Polymeric Additives in Dodecane**  
Technical Paper Publication. IMECE2018-88555  
*Gurjap Singh, Stephen Pitts, University of Iowa, IOWA CITY, IA, United States, Elio Lopes, Santa Catarina State University, Joinville, Santa Catarina, Brazil, Albert Ratner, Univ Of Iowa, Iowa City, IA, United States*

## **9-2 16TH SYMPOSIUM ON ELECTRIC, MAGNETIC AND THERMAL PHENOMENA IN MICRO AND NANO-SCALE SYSTEMS**

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### **9-2-1 Electric, Magnetic & Thermal Phenomena**

**Third Floor, David L. Lawrence Convention Center, Room 317      2:05pm - 3:50pm**

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Session Chair: **Dennis A. Siginer**, *Botswana International University of Science and Technology & Universidad de Santiago de Chile, Santiago in Chile & Palapye in Botswana, Chile*  
Session Co-Chair: **Boris Khusid**, *New Jersey Inst Of Tech, Newark, NJ, United States*

**2:05pm**                      **Characterizing Microfluidic Operations Underlying an Electrowetting Heat Pipe on the International Space Station**  
Technical Paper Publication. IMECE2018-86223

*Enakshi Wikramanayake, The University of Texas At Austin, Austin, TX, United States, Renee Hale, University of Texas, Austin, TX, United States, John Elam, The University of Texas at Austin, Austin, TX, United States, Arjang Shahriari, Vaibhav Bahadur, University of Texas At Austin, Austin, TX, United States, Angel R. Alvarez-Hernandez, Nathan Howard, NASA Johnson Space Center, Houston, TX, United States*

**2:26pm**                      **Dielectrophoretic Control of a Droplet at the Interface of Two Liquids in a Three Liquid System**  
Technical Paper Publication. IMECE2018-86487

*Manojkumar Lokanathan, Enakshi Wikramanayake, The University of Texas at Austin, Austin, TX, United States, Vaibhav Bahadur, University of Texas At Austin, Austin, TX, United States, Roger Bonnecaze, The University of Texas at Austin, Austin, TX, United States*

**2:47pm**                      **Enhancement in Gas Pumping to Generate Corona Wind by an EHD Gas Pump**  
Technical Presentation. IMECE2018-86958  
*A.K.M. Monayem Mazumder, Saginaw Valley State University, Saginaw, MI, United States*

**3:08pm**                      **Electric field control of propulsion force of chemically driven Marangoni locomotor**  
Technical Presentation. IMECE2018-87233  
*Shigeki Tsuchitani, Takumi Ikebe, Hirofumi Miki, Kunitomo Kikuchi, Wakayama University, Wakayama, Japan*

**9-4 24TH SYMPOSIUM ON FUNDAMENTAL ISSUES  
AND PERSPECTIVES IN FLUID MECHANICS**

**9-4-2 Computational Methods in Fluid Mechanics**

**Third Floor, David L. Lawrence Convention Center,  
Room 318 2:05pm - 3:50pm**

Session Chair: **Taewoo Lee**, *Arizona State Univ, Tempe, AZ, United States*

Session Co-Chair: **Wayne Strasser**, *Eastman Chemical Co, Kingsport, TN, United States*

**2:05pm A Central Difference Finite Volume Lattice Boltzmann Method for Simulation of 2D Inviscid Compressible Flows on Triangular Meshes**

Technical Paper Publication. IMECE2018-86302

**Alireza Karbalaee**, *University of Central Florida, Orlando, FL, United States*, **Kazem Hejranfar**, *Sharif University of Technology, Tehran, Iran*

**2:26pm Finite Element Models of One Dimensional Flows With Node-Dependent Accuracy**

Technical Paper Publication. IMECE2018-86852

**Daniele Guarnera**, **Enrico Zappino**, **Alfonso Pagani**, **Erasmus Carrera**, *Politecnico di Torino, Torino, Italy*

**2:47pm Characterization of Model-Based Uncertainties in Incompressible Turbulent Flows by Machine Learning**

Technical Paper Publication. IMECE2018-87178

**Mustafa Usta**, *Lehigh University, Bethlehem, PA, United States*, **Ali Tasyali**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

**3:08pm Computational Investigation of Flow Over Geometry Compliant Lattice Structures**

Technical Paper Publication. IMECE2018-87846

**James Tinsley**, *Honeywell FM&T, Kansas City, MO, United States*, **Kelly Homan**, *Missouri University of Science & Technology, Rolla, MO, United States*, **Gregory Vernon**, *Honeywell FM&T, Kansas City, MO, United States*

**3:29pm Bridging method of turbulence for high Reynolds number separated flows past bluff bodies**

Technical Presentation. IMECE2018-89693

**Sagar Saroha**, **Sawan S. Sinha**, *Indian Institute of Technology Delhi, Delhi, India*, **Sunil Lakshminpathy**, *Gexcon AS, Bergen, Norway*

**9-16 11TH FORUM ON FLUID MEASUREMENTS AND INSTRUMENTATION**

**9-16-2 Fluid Measurements and Instrumentation - II**

**Third Floor, David L. Lawrence Convention Center,  
Room 319 2:05pm - 3:50pm**

Session Chair: **Ivaylo Nedyalkov**, *University of New Hampshire, Durham, NH, United States*

**2:05pm Practical Considerations for Simultaneous LDV and PIV Measurements**

Technical Presentation. IMECE2018-86841

**Stamatios Pothos**, **Daniel Troolin**, **Aaron Boomsma**, *TSI Incorporated, Shoreview, MN, United States*

**2:26pm An Experimental Setup to Characterize Boundary Layer Asymmetry on a Spinning Projectile Using Magnetic Resonance Velocimetry**

Technical Paper Publication. IMECE2018-87472

**Kevin Sullivan**, *U.S. Military Academy, Avon Lake, OH, United States*, **Aaron P. Schlenker**, *U.S. Military Academy, Lenhartsville, PA, United States*, **Noah W. Siegel**, *United States Military Academy, Las Vegas, NV, United States*, **Isaiah Valdez**, *U.S. Military Academy, Aztec, NM, United States*, **Bret Van Poppel**, **Michael Benson**, *U.S. Military Academy, West Point, NY, United States*, **Gregory Rodebaugh**, *Armament Research Development and Engineering Center, Picatinny, NJ, United States*, **Christopher Elkins**, *Stanford University, Palo Alto, CA, United States*, **Chase Snow**, *U.S. Army, West Point, NY, United States*

**2:47pm Weep Hole and Interlayer Gap Flow Within Layered Pressure Vessels**

Technical Paper Publication. IMECE2018-87948

**Cameron Coates**, **Timothy Chastain**, *Georgia Southern University, Savannah, GA, United States*

**3:08pm CFD ANALYSIS OF VORTEX SHEDDING OF AN ISOLATED ROLLING TIRE**

Technical Presentation. IMECE2018-88443

**Navid Goudarzi**, *UNCC, Charlotte, NC, United States*

**3:25pm Optical Measurement Techniques to Develop Open Cardiovascular Devices**

Technical Presentation. IMECE2018-88630

**Keefe Manning**, *Penn State Univ, University Park, PA, United States*

**9-4 24TH SYMPOSIUM ON FUNDAMENTAL ISSUES  
AND PERSPECTIVES IN FLUID MECHANICS**

**9-4-3 Fundamental Fluids Engineering and Applications**

**Third Floor, David L. Lawrence Convention Center,  
Room 318 4:00pm - 5:45pm**

Session Chair: **John Buchanan**, *UNNPP, Pittsburgh, PA, United States*

Session Co-Chair: **Wayne Strasser**, *Eastman Chemical Co, Kingsport, TN, United States*

**4:00pm The Effect of Delta Winglet Inclination Angle on the Vortical Flow Downstream**

Technical Paper Publication. IMECE2018-86331

**Junguo Wang**, *University of Windsor, Windsor, ON, Canada*, **David Ting**, *Univ Of Windsor, Windsor, ON, Canada*, **Steve Ray**, *Essex Energy, Oldcastle, ON, Canada*

**4:21pm Numerical Investigation of Velocity Coefficient for Organic Turbine Nozzles Using MM As Working Fluid**

Technical Paper Publication. IMECE2018-87212

**LAIHE ZHUANG**, **Guoqiang Xu**, **Jie Wen**, **bensidong**, *BEIHANG University, Beijing, China*

**4:42pm** Analyzing the Shear Heating Effects in Modeling the Hydrodynamic Lubrication of High Torque Low Speed Diesel Engine by Considering Different Viscosity-Grade Lubricants

Technical Paper Publication. IMECE2018-88238

*Saqib Naseer, NUST College of Electrical and Mechanical Engineering, Rawalpindi, Pakistan, Syed Adnan Qasim, NUTECH School of Engineering & Technologies, Islamabad, Punjab, Pakistan, Raja Amer Azim, NUST college of E&ME, Rawalpindi, Punjab, Pakistan, Kishwat Ijaz Malik, University of Wah, Wah cant, Punjab, Pakistan*

**5:03pm** Performance Evaluation of Coefficient of Performance of Variable Refrigerants using Vapour Compression Refrigeration System Model

Technical Presentation. IMECE2018-88774

*Cyril Okorowo, Institute of Management and Technology, Enugu, Enugu, Nigeria, Okechukwu T. Onah, Enugu State University of Science and Technology, Enugu, Enugu, Nigeria*

**5:24pm** Organized Motion of Turbulent Flow at Low Reynolds Number in a Square Duct

Technical Presentation. IMECE2018-89560

*Hamid Hassan Khan, Indian Institute of Technology Delhi, New Delhi, India, Syed Fahad Anwer, Nadeem Hasan, Aligarh Muslim University, Aligarh, Uttar Pradesh, India, Sanjeev Sanghi, Indian Institute of Technology Delhi, New Delhi, Delhi, India*

## Heat Transfer and Thermal Engineering MONDAY, NOVEMBER 12

**10-3 K6-2 NUMERICAL ANALYSIS AND PERFORMANCE ASSESSMENT OF ENERGY SYSTEMS**

**10-3-1 K6-2 Numerical Analysis and Performance Assessment of Energy Systems**

**Third Floor, David L. Lawrence Convention Center, Room 323 9:45am - 11:30am**

Session Chair: *Mitra Sexton, Knolls Atomic Power Lab, Clifton Park, NY, United States*

**9:45am** Numerical Simulation of Convection and Heat Transfer in Unsteady Transverse Tube Banks

Technical Paper Publication. IMECE2018-86897

*Ling ling, Wenjie Wang, Mo Yang, University of Shanghai for Science and Technology, Shanghai, China*

**10:06am** Forced Convection Enhancement in a Square Channel by an EHD Gas Pump

Technical Presentation. IMECE2018-86961

*A.K.M. Monayem Mazumder, Saginaw Valley State University, Saginaw, MI, United States*

**10:27am** Numerical Investigation on Simultaneous Effects of Surface Roughness and Variable Properties on Laminar Flow in Annular Tubes

Technical Paper Publication. IMECE2018-88288

*Morteza Heydari, Amirhossein Bagheri, Hamid Sadat, Huseyin Bostanci, Seifollah Nasrazadani, University of North Texas, Denton, TX, United States*

**10:48am** Accelerating Evaluation of Converged Lattice Thermal Conductivity

Technical Presentation. IMECE2018-89007

*Guangzhao Qin, Ming Hu, University of South Carolina, Columbia, SC, United States*

**11:09am** THE ADIABATIC ANALYSIS ON ROTARY DISPLACER STIRLING ENGINE

Technical Paper Publication. IMECE2018-87758

*Amirhossein Bagheri, William C. Mullins, Phillip R. Foster, Huseyin Bostanci, University of North Texas, Denton, TX, United States*

**10-4 K6-3 HEAT TRANSFER ANALYSIS IN WASTE HEAT RECOVERY SYSTEMS**

**10-4-2 Component/Material Design and Analysis**

**Third Floor, David L. Lawrence Convention Center, Room 327 9:45am - 11:30am**

Session Chair: *Hohyun Lee, Santa Clara University, Santa Clara, CA, United States*

**9:45am** Studies on the Hard Chrome Plating in Reciprocating Air Compressors

Technical Paper Publication. IMECE2018-86532

*Aadhithiyan Amutha Kulasekaran, National Institute of Technology, Sundergarh, Odisha, India, Anbarasu Subramanian, National Institute of Technology, Rourkela, Rourkela, Odisha, India*

**10:06am** Experimental Investigation of Heat Pipe Heat Exchanger (HPHE) for Waste Heat Recovery Application

Technical Presentation. IMECE2018-88031

*Md. Farhan Shakil, AKM M. Morshed, Bangladesh University of Engineering & Technology, Dhaka, Select State/Province, Bangladesh, Azzam Salman, University of South Carolina, West Columbia, SC, United States, Titan Paul, University of South Carolina Aiken, Aiken, SC, United States*

**10:27am** Thermomechanical Reliability in Thermoelectric Power Generators Consisting of Low Thermal Conductivity Materials

Technical Presentation. IMECE2018-86606

*Hee Seok Kim, University of South Alabama, Mobile, AL, United States*

**10:48am** Thermal and Phonon Transport Analysis in 2D Materials Systems with Record-High Efficiency for Waste Heat Recovery

Technical Presentation. IMECE2018-86053

*Joon Sang Kang, Man Li, Yongjie Hu, University of California, Los Angeles (UCLA), Los Angeles, CA, United States*

**10-21 K9-1 THERMAL TRANSPORT ACROSS HARD/  
SOFT INTERFACES**

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**10-21-1 K9-1 Thermal transport across hard/soft inter-  
faces - I**

**Third Floor, David L. Lawrence Convention Center,  
Room 325 9:45am - 11:30am**

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Session Chair: **Xiulin Ruan**, *Purdue Univ, West Lafayette, IN, United States*

Session Co-Chair: **Sangyeop Lee**, *University of Pittsburgh, Pittsburgh, PA, United States*

**9:45am Achieving Huge Thermal Conductance of  
Metallic Nitride on Graphene Through Enhanced Elastic and  
Inelastic Phonon Transmission**

Technical Presentation. IMECE2018-89402

**Weidong Zheng, Bin Huang, Hongkun Li, Yee Kan Koh**, *National University of Singapore, Singapore, Singapore*

**10:06am Nonequilibrium Landauer approach  
for thermal interfaces**

Technical Presentation. IMECE2018-89938

**Jingjing Shi, Xiaolong Yang**, *Purdue University, West Lafayette, IN, United States*, **Timothy Fisher**, *UCLA, Los Angeles, CA, United States*, **Xiulin Ruan**, *Purdue Univ, West Lafayette, IN, United States*

**10:27am Fullerene-based Superatomic Crystals?  
Thermal Transport Controlled by Orientation Disorder**

Technical Presentation. IMECE2018-87762

**Matthew Bartnof, Alexander D. Christodouides**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Wee-Liat Ong**, *School of Mechanical Engineering, ZJU-UIUC, Zhejiang University, Haining, Zhejiang Province, China*, **Evan O'Brien, Xavier Roy**, *Columbia University Department of Chemistry, New York, NY, United States*, **Alan McGaughey**, *Carnegie Mellon Univ, Pittsburgh, PA, United States*, **Jonathan Malen**, *Carnegie Mellon University, Pittsburgh, PA, United States*

**10:48am Strain Effect on Thermal Transport  
in Carbon Nanotube-Graphene Junctions**

Technical Paper Publication. IMECE2018-87764

**Jungkyu Park, Paul Pena**, *Kennesaw State University, Marietta, GA, United States*

**11:09am Implication of 1D-2D van der Waals  
Heterostructures for Pressure Sensors**

Technical Presentation. IMECE2018-89083

**Yuan Gao**, *University of Virginia, Charlottesville, VA, United States*, **Baoxing Xu**, *University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States*

**10-51 K20-1 THERMAL MANAGEMENT OF ELEC-  
TRONIC EQUIPMENT**

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**10-51-1 Thermal Management of Electronic Equipment**

**Fourth Floor, David L. Lawrence Convention Center,  
Room 404 9:45am - 11:30am**

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Session Chair: **Columbia Mishra**, *Intel Corporation, Hillsboro, OR, United States*

Session Co-Chair: **Vaibhav Bahadur**, *University of Texas At Austin, Austin, TX, United States*, **Shima Hajimirza**, *Texas A&M University, College Station, TX, United States*

**9:45am Design and Testing of Liquid Cooled Thermal  
Solution for High Loading (Socket P) Processors**

Technical Paper Publication. IMECE2018-86730

**Anali Soto, Veronica Torreblanca**, *Intel, Zapopan, Jalisco, Mexico*, **Devdatta Kulkarni**, *Intel, Hillsboro, OR, United States*

**10:06am Spray Cooling-Based Thermal Man-  
agement of Extreme Power Densities using Orthotropic Com-  
posite Heat Spreaders**

Technical Presentation. IMECE2018-87708

**Huseyin Bostanci, Sai S. Obuladinne**, *University of North Texas, Denton, TX, United States*

**10:27am Raising Inlet Air Temperature for  
a Hybrid-Cooled Server Retrofitted With Liquid Cooled Cold  
Plates**

Technical Paper Publication. IMECE2018-88497

**Utkarsh Chawhan**, *University of Texas At Arlington, Arlington, TX, United States*, **Ashwin Siddarth**, *University of Texas Arlington, Arlington, TX, United States*, **Manasa Sahini, Dereje Agonafer**, *University of Texas At Arlington, Arlington, TX, United States*

**10:48am Feasibility Study of Effective Cool-  
ing Through Microchannel Heat Sink (MCHS) and Nanofluid  
Applications**

Technical Paper Publication. IMECE2018-88690

**Darryl Jennings, Jr., Sonya Smith**, *Howard University, Washington, DC, United States*

**11:09am Wake Vortex Regimes in Airflows  
Generated by Piezoelectric Fans and their Effect on the Mean  
Air Jet**

Technical Presentation. IMECE2018-89181

**Navid Dehdari Ebrahimi**, *University of California, Los Angeles, Los Angeles, CA, United States*, **Y. Sungtaek Ju**, *University of California, Los Angeles (UCLA), Los Angeles, CA, United States*

## 10-59 K22-1 HEAT AND MASS TRANSPORT PHOTO-GALLERY

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### 10-59-1 Heat and Mass Transport Photogallery

Third Floor, David L. Lawrence Convention Center,  
Room 326 9:45am - 11:30am

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Session Chair: **Shreyas Chavan**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

Session Co-Chair: **Muhammad Jahidul Hoque**, *University of Illinois Urbana-Champaign, Urbana, IL, United States*

#### 9:45am Coalescence-Induced Droplet Jumping on Superhydrophobic Nanostructured, Superhydrophobic Hierarchical, and Biphilic Hierarchical Surfaces

Poster Presentation. IMECE2018-86903

**Xiao Yan**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **Soumyadip Sett**, *University of Illinois, Urbana, IL, United States*, **Lezhou Feng**, **Leicheng Zhang**, *UIUC, Urbana, IL, United States*, **Zhiyong Huang**, **Feng Chen**, *Tsinghua University, Beijing, Beijing, China*, **Nenad Miljkovic**, *University of Illinois At Urbana-Champaign, Urbana, IL, United States*

#### 9:55am Dynamic Defrosting on Superhydrophobic and Bi-Philic Surfaces

Poster Presentation. IMECE2018-86943

**Shreyas Chavan**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*, **Kalyan Boyina**, *University of Illinois, Urbana, IL, United States*, **Kirk Fortelka**, **Maury Lira**, **Peter Sokalski**, **Deokgeun Park**, **Nenad Miljkovic**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

#### 10:05am Water Vapor Condensation on Bi-Conductive Surfaces

Poster Presentation. IMECE2018-87081

**Moonkyung Kim**, **Xiao Yan**, **Sean Ebihara**, **Irene Andsgager**, **Nenad Miljkovic**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

#### 10:15am Flow Visualization of Microscale Effusion and Transpiration Cooling on Semi-cylinder for Gas Turbine Cooling Application

Technical Presentation. IMECE2018-87257

**Dong Hwan Shin**, **Seongsik Moon**, **Jin Sub Kim**, *Korea Institute of Machinery & Materials (KIMM), Daejeon, Korea (Republic)*, **Do Won Kang**, **Jeong Lak Sohn**, *Korea Institute of Machinery & Materials (KIMM), Daejeon, Korea (Republic)*, **Jungho Lee**, *Korea Institute of Machinery & Materials (KIMM), Daejeon, Korea (Republic)*

#### 10:25am Visualization of Two-phase Bursting Flow inside the Entire Thermosyphon at Different Filling Ratios

Technical Presentation. IMECE2018-87269

**Yeonghwan Kim**, **Dong Hwan Shin**, **Jin Sub Kim**, *Korea Institute of Machinery & Materials (KIMM), Daejeon, Korea (Republic)*, **Seung M. You**, *The University Of Texas At Dallas, Richardson, TX, United States*, **Jungho Lee**, *Korea Institute of Machinery & Materials (KIMM), Daejeon, Korea (Republic)*

#### 10:35am Dropwise Condensation Of Ethanol On Lubricant-Infused Surfaces

Poster Presentation. IMECE2018-87283

**Soumyadip Sett**, **Longnan Li**, **Kalyan Boyina**, **Peter Sokalski**, *University of Illinois, Urbana, IL, United States*, **Xiao Yan**, **Nenad Miljkovic**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

#### 10:45am Visualization study on hydrodynamics and material deformation of zirconium wire by transient pool boiling

Poster Presentation. IMECE2018-87287

**Jun-young Kang**, *Korea Atomic Energy Research Institute (KAERI), DAEJEON, Korea (Republic)*, **SeungHyun Hong**, **Byong-Guk Jeon**, **Yong Seok Choi**, **Seok Cho**, **Jong-Kuk Park**, **Sang-Ki Moon**, *KAERI (Korea Atomic Energy Research Institute), DAEJEON, Korea (Republic)*

#### 10:55am Cicada-inspired Self-cleaning Superhydrophobic Surfaces

Poster Presentation. IMECE2018-87924

**Junho Oh**, *University of Illinois, Urbana, IL, United States*, **Sabrina Yin**, **Shreyas Chavan**, *University of Illinois At Urbana-Champaign, Urbana, IL, United States*, **Catherine Dana**, *University of Illinois, Urbana, IL, United States*, **Sungmin Hong**, **Jessica Roman**, **Kyoo Jo**, **Donald M Crokek**, *Army Construction Engineering Research Laboratory, Champaign, IL, United States*, **Mari-ann Alleyne**, *University of Illinois, Urbana, IL, United States*, **Nenad Miljkovic**, *University of Illinois At Urbana-Champaign, Urbana, IL, United States*

#### 11:05am Visualization of Droplet Nucleation on Patterned Hybrid Surfaces

Poster Presentation. IMECE2018-88092

**Muhammad Jahidul Hoque**, *University of Illinois Urbana-Champaign, Urbana, IL, United States*, **Seok Kim**, **Nenad Miljkovic**, *University of Illinois at Urbana-Champaign, Urbana, IL, United States*

#### 11:15am Visualizing Confined Boiling of Self-Assembled Liquid Bridges for Electronics Cooling

Technical Presentation. IMECE2018-88922

**Thomas Foulkes**, **Shreyas Chavan**, **Junho Oh**, *University of Illinois At Urbana-Champaign, Urbana, IL, United States*, **Robert Pilawa**, *UC Berkeley, Berkeley, CA, United States*, **Nenad Miljkovic**, *University of Illinois At Urbana-Champaign, Urbana, IL, United States*

Draft Program

**10-60 PROF. FRANK KREITH MEMORIAL SYMPOSIUM: ADVANCES IN HEAT TRANSFER, ENERGY SYSTEMS & SUSTAINABILITY**

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**10-60-1 Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability -I**

**Third Floor, David L. Lawrence Convention Center, Room 324 9:45am - 11:30am**

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Session Chair: **Raj M. Manglik**, *University Of Cincinnati, Cincinnati, OH, United States*

Session Co-Chair: **Satwindar Sadhal**, *University of Southern California, Los Angeles, CA, United States*, **John Maulbetsch**, *Maulbetsch Consulting, Menlo Park, CA, United States*

**9:45am Sunrise Delayed but the Sun Shines Brightly: The Legacy of Professor Frank Kreith**  
Technical Presentation. IMECE2018-86304  
**Raj M. Manglik**, *University Of Cincinnati, Cincinnati, OH, United States*

**10:06am Thirst for Power: Energy, Water and Human Survival**  
Technical Presentation. IMECE2018-86320  
**Michael E. Webber**, *The University of Texas At Austin, Austin, TX, United States*

**10:27am Multi-Scale Modeling of Power Plant Performance Enhancement Using Asynchronous Thermal Storage and Heat Rejection**  
Technical Paper Publication IMECE2018-88107  
**Lauren B. Gagnon**, *University of California, Berkeley, CA, United States*, **Dre Helms**, *University of California, Berkeley, Berkeley, CA, United States*, **Van P. Carey**, *University Of California, Berkeley, CA, United States*

**10:48am How long is the lull? Supply and demand responses to wind and solar variability**  
Technical Presentation. IMECE2018-89623  
**Robert Socolow**, *Princeton University, Princeton, NJ, United States*

**11:09am Bringing solar hot water to a Navajo school in Breadsprings, New Mexico using CPC stationary concentrators**  
Technical Presentation. IMECE2018-90055  
**Joseph J O'Gallagher**, *Alternative Energy Solutions, Flossmoor, IL, United States*, **Roland Winston**, *University Of Calif, Merced, Merced, CA, United States*

**10-4 K6-3 HEAT TRANSFER ANALYSIS IN WASTE HEAT RECOVERY SYSTEMS**

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**10-4-1 System Analysis**

**Third Floor, David L. Lawrence Convention Center, Room 323 1:45pm - 3:30pm**

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Session Chair: **Alexander Rattner**, *The Pennsylvania State University, University Park, PA, United States*

**1:45pm Thermodynamic Analysis and Multi-Objective Optimizations of a Combined Recompression sCO<sub>2</sub> Brayton Cycle: tCO<sub>2</sub> Rankine Cycles for Waste Heat Recovery**  
Technical Paper Publication. IMECE2018-86844  
**Ali Alsagri**, *University of Dayton, Beavercreek, OH, United States*, **Andrew Chiasson**, *University of Dayton, Dayton, OH, United States*, **Ahmad/ A Aljabr**, *University of Dayton, Dayton, OH, United States*

**2:06pm Simple Analytic Model for Optimally Sizing Thermoelectric Generator Module Arrays**  
Technical Presentation. IMECE2018-87145  
**Alexander Rattner**, *The Pennsylvania State University, University Park, PA, United States*

**2:27pm Efficiency Improvement in Small Internal Combustion Engine Using Exhaust Heat Recovery System**  
Technical Paper Publication. IMECE2018-87565  
**Shashank Rai**, *LAWRENCE TECH UNIVERSITY, Southfield, MI, United States*, **Selin Arslan**, *Lawrence Tech Univ, Southfield, MI, United States*, **Badih Jawad**, *Lawrence Technological University, Dearborn Heights, MI, United States*

**2:48pm Uniquely Designed Solar Tube in a Natural/ Forced Mini-Water Heating System**  
Technical Paper Publication. IMECE2018-86896  
**Amanie Abdelmessih**, *California Baptist University, Diamond Bar, CA, United States*, **Siddiq/ S.S. Mohammed**, *California Baptist University, Riverside, CA, United States*

**3:09pm Performance Prediction Modeling of a Full-Scale Electrostatic Precipitator**  
Technical Presentation. IMECE2018-89748  
**Abu Aven Md. Asraf Siddique**, *Arkansas State University, Jonesboro, AR, United States*, **Kwangkook Jeong**, *Arkansas State University, State University, AR, United States*, **Shinku Lee**, *Doosan Heavy Industries & Construction Co., LTD, Gyeongnam, Korea (Republic)*, **Eungchul Lee**, *Doosan Heavy Industries & Construction Co. Ltd., Gyeongnam, Korea (Republic)*

**10-20 K8-6 PANEL ON FUNDAMENTALS OF NON-EQUILIBRIUM TRANSPORT (JOINT WITH K9)**

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**10-20-1 Panel on Fundamentals of Non-Equilibrium Transport**

**Third Floor, David L. Lawrence Convention Center, Room 326 1:45pm - 3:30pm**

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Session Chair: **Yan Wang**, *University of Nevada, Reno, Reno, NV, United States*  
Session Co-Chair: **Xiulin Ruan**, *Purdue Univ, West Lafayette, IN, United States*

**1:45pm Non-equilibrium transport in two-dimensional materials**  
Panel Presentation. IMECE2018-90005  
**Xianfan Xu**, *Purdue University, West Lafayette, IN, United States*

**2:06pm Optical generation and detection of non-equilibrium phonons and magnons**  
Panel Presentation. IMECE2018-90032  
**Li Shi**, *University of Texas, Austin, TX, United States*

Draft Program

**2:27pm** Role of ballistic electron transport and electron-injection on thermal conductance across metal/non-metal interfaces

Panel Presentation. IMECE2018-90063

*Patrick E. Hopkins, University of Virginia, Charlottesville, VA, United States*

**2:48pm** A multi-temperature model for non-equilibrium thermal transport

Panel Presentation. IMECE2018-90058

*Xiulin Ruan, Purdue Univ, West Lafayette, IN, United States*

## **10-21 K9-1 THERMAL TRANSPORT ACROSS HARD/ SOFT INTERFACES**

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**10-21-2 K9-1 Thermal transport across hard/soft interfaces - II**

**Third Floor, David L. Lawrence Convention Center, Room 325 1:45pm - 3:30pm**

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Session Chair: **Bladimir Ramos**, Penn State University, University Park, PA, United States

Session Co-Chair: **Hasan Babaei**, University of Pittsburgh, Carnegie Mellon University, Pittsburgh, PA, United States

**1:45pm** PREDICTION OF SPECTRAL CONTRIBUTION TO THERMAL BOUNDARY CONDUCTANCE BETWEEN DIS-SIMILAR MATERIALS EXHIBITING EXTREME INTERFACIAL BOND STRENGTHS

Technical Presentation. IMECE2018-87554

*James Moughamian, Utah State University, Logan, UT, United States, William Yorgas, Utah State, Logan, UT, United States, Nicholas Roberts, Utah State University, Logan, UT, United States*

**2:06pm** Heat Transfer Across Crystalline and Amorphous Silicon Surfaces in Contact With Water and the Effects of the Interfacial Liquid Structuring

Technical Paper Publication. IMECE2018-86497

*Luis E. Paniagua-Guerra, C. Ulises Gonzalez-Valle, Penn State University, State College, PA, United States, Bladimir Ramos, Penn State University, University Park, PA, United States*

**2:27pm** Interfacial Heat Transfer Between Erythritol and Xylitol Crystals As a Mixture Heat Storage Material

Technical Paper Publication. IMECE2018-87195

*Biao Feng, Zhejiang University, Hangzhou, Zhejiang, China, Liwu Fan, Zhejiang University, Hangzhou, Zhejiang, China*

**2:48pm** Heat Transfer across 3C-SiC-water Interfaces: Solid-Liquid Affinity, Interfacial Structuring, and Spectral Characteristics

Technical Presentation. IMECE2018-88890

*C. Ulises Gonzalez-Valle, Penn State University, State College, PA, United States, Bladimir Ramos, Penn State University, University Park, PA, United States*

## **10-40 K15-1 TRANSPORT PHENOMENA IN MANUFACTURING AND MATERIALS PROCESSING**

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**10-40-1 K15-1 Transport Phenomena in Manufacturing and Materials Processing - I**

**Third Floor, David L. Lawrence Convention Center, Room 327 1:45pm - 3:30pm**

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Session Chair: **Patrick Mensah**, Southern University, Baton Rouge, LA, United States

Session Co-Chair: **Stephen Akwaboa**, Southern University and A&M College, Baton Rouge, LA, United States

**1:45pm** Defects Evaluation of Selective Laser Melting Stainless Steel 316 Parts Using Positron Annihilation Lifetime Measurement

Technical Paper Publication. IMECE2018-86729

*Hong Yao, LSU, Baton Rouge, LA, United States, Ryan Katona, University of Virginia, Charlottesville, VA, United States, Jianren Zhou, Louisiana State University, Baton Rouge, LA, United States, Md Islam, LSU, Baton Rouge, LA, United States, Jonathan Raush, ULL, Lafayette, LA, United States, Fengyuan Lu, LSU, Baton Rouge, LA, United States, shengmin guo, Louisiana State University, Baton Rouge, LA, United States*

**2:06pm** Scale up of powder flow and heat transfer in rotary kilns

Technical Presentation. IMECE2018-89951

*Bereket Yohannes, Anna Nachtigal, William Borghard, Fernando Muzzio, Benjamin Glasser, Alberto Cuitino, Rutgers University, Piscataway, NJ, United States*

**2:27pm** Phase Evolution and Corrosion Performance of Laser Processed Oxide Dispersion Strengthened Ferritic Alloys

Technical Paper Publication. IMECE2018-86736

*Ali Hemmasian Etefagh, Hao Wen, Fengyuan Lu, LSU, Baton Rouge, LA, United States, shengmin guo, Louisiana State University, Baton Rouge, LA, United States*

**2:48pm** Atomistic Modeling of Ga Doping of Crystalline Si by Focused Ion Beam

Technical Presentation. IMECE2018-89933

*Srilok Srinivasan, Iowa State University, Ames, IA, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Zayd Leseman, Kansas State University, Manhattan, KS, United States*

## **10-54 K20-4 METHODS IN COMPUTATIONAL HEAT TRANSFER**

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**10-54-1 Methods in Computational Heat Transfer**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 1:45pm - 3:30pm**

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Session Chair: **Cheng-xian Lin**, Florida International University, Miami, FL, United States

Session Co-Chair: **Xiuling Wang**, Purdue University Northwest, Hammond, IN, United States

**1:45pm** Effects of vacancy cluster defects on phonon transport of the phase change material GeTe using a neural network interatomic potential  
**Technical Presentation.** IMECE2018-89390  
*Ruiqiang Guo, Sangyeop Lee, University of Pittsburgh, Pittsburgh, PA, United States*

**2:06pm** A Transient Approach to Determine Heat Source Strength and Location in a Wall Plume  
**Technical Presentation.** IMECE2018-89809  
*Ardeshir Bangian Tabrizi, Rutgers University, New Brunswick, NJ, United States, Yogesh Jaluria, Rutgers Univ, Piscataway, NJ, United States*

**2:27pm** Applying a Radiative Heat Transfer Finite-Volume Methodology to a Geometrically Complex Furnace  
**Technical Paper Publication.** IMECE2018-86831  
*Georgios Lygidakis, Stavros Leloudas, Ioannis Nikolos, Technical University of Crete, Chania, Greece*

**2:48pm** An Integrated Method of FVM and SPH for Treating Melting Process of Quartz Ingot  
**Technical Paper Publication.** IMECE2018-86113  
*Zhongyi Liu, Huazhong University of Science & Technology, Wuhan, Hubei, China, Jing Wang, Huazhong University of Science and Technology, Wuhan, Hubei, China, Qianli Ma, Haisheng Fang, Huazhong University of Science & Technology, Wuhan, Hubei, China*

**3:09pm** Heat Transfer Enhancement in Wavy Micro-Channels Through Multiharmonic Surfaces  
**Technical Paper Publication.** IMECE2018-86425  
*Justin Moon, California State University, Los Angeles, Los Angeles, CA, United States, J. Rafael Pacheco, S/P, America, Inc., Tempe, AZ, United States, Arturo Pacheco-Vega, California State University, Los Angeles, Los Angeles, CA, United States*

## **10-60 PROF. FRANK KREITH MEMORIAL SYMPOSIUM: ADVANCES IN HEAT TRANSFER, ENERGY SYSTEMS & SUSTAINABILITY**

### **10-60-2 Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability - II**

**Third Floor, David L. Lawrence Convention Center, Room 324 1:45pm - 3:30pm**

Session Chair: **Satwindar Sadhal**, *University of Southern California, Los Angeles, CA, United States*  
Session Co-Chair: **John Maulbetsch**, *Maulbetsch Consulting, Menlo Park, CA, United States*, **Raj M. Manglik**, *University Of Cincinnati, Cincinnati, OH, United States*

**1:45pm** Recent Advances in Thermal Energy Storage using Phase Change Materials  
**Technical Presentation.** IMECE2018-88900  
*D. Yogi Goswami, Univ Of South Florida, Tampa, FL, United States*

**2:06pm** Experimental and economic evaluation of some promising flat plate solar collectors  
**Technical Presentation.** IMECE2018-88779  
*Noam Lior, Univ Of Pennsylvania, Philadelphia, PA, United States*

**2:27pm** Future Scenarios for Emissions From Energy and Power Production in the Rocky Mountain Region  
**Technical Paper Publication.** IMECE2018-87614  
*Rene Nsanzineza, Jana Milford, University of Colorado Boulder, Boulder, CO, United States*

**2:48pm** Near Term Prospects for Solar Syngas and Hydrogen  
**Technical Presentation.** IMECE2018-89758  
*Jane Davidson, University of Minnesota, Wayzata, MN, United States*

**3:09pm** Forced Convection in High Porosity Metal Foams in a Square Duct in Presence of an Array of Impinging Jets  
**Technical Presentation.** IMECE2018-88939  
*Roop Mahajan, Virginia Tech, Blacksburg, VA, United States, Prashant Singh, North Carolina State University, Raleigh, NC, United States*

## **10-6 K6-5 THERMAL MANAGEMENT OF BATTERY SYSTEMS**

### **10-6-1 Batteries**

**Third Floor, David L. Lawrence Convention Center, Room 324 3:30pm - 5:30pm**

Session Chair: **Leitao Chen**, *Rice University, Houston, TX, United States*  
Session Co-Chair: **Laura Schaefer**, *Rice University, Houston, TX, United States*

**3:45pm** In Situ Characterization of the Thermal, Ionic, and Mechanical Behaviors of Lithium Ion Batteries for Advanced Thermal Management  
**Technical Presentation.** IMECE2018-86049  
*Yongjie Hu, Joon Sang Kang, Ming Ke, University of California, Los Angeles (UCLA), Los Angeles, CA, United States*

**4:06pm** 3D-Printed PCM/HDPE Composites for Battery Thermal Management  
**Technical Paper Publication.** IMECE2018-86081  
*Thomas Freeman, Embry-Riddle Aeronautical University, Carthage, NC, United States, Kaloki Nabutola, David Spitzer, Patrick Currier, Sandra Boetcher, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

**4:27pm** A Comprehensive Parametric Study of Minichannel Based Liquid Cooling of Li-Ion Battery Pack  
**Technical Paper Publication.** IMECE2018-87923  
*Zhoujian An, Krishna Shah, University of California, Merced, CA, United States, Yanbao Ma, Univ. California, Merced, Merced, CA, United States, Jia Li, Beijing Jiaotong University, Beijing, China*

**4:48pm Development of a Nine-Cell Hybrid Heat Sink for Thermal Management of Hot-Spots ? Concentrated Photo-voltaic Applications**

**Technical Presentation.** IMECE2018-88839

*Ibrahim Hassan, Texas A&M University At Qatar, Dohar, Qatar, Ahmad Almomani, Danish Rahman, Texas A&M Univeristy at Qatar, Doha, Doha, Qatar, Aziz Rahman, Texas A&M University at Qatar, Doha, Qatar, Yasser Al Hamidi, Texas A and M University, College Station, TX, United States*

**10-8 K6-7 HEAT TRANSFER IN PASSIVE THERMAL CONTROL SYSTEMS**

**10-8-1 Heat Transfer in Passive Thermal Control Systems**

**Third Floor, David L. Lawrence Convention Center, Room 327 3:45pm - 5:30pm**

Session Chair: **Rydge Mulford**, Brigham Young University, Provo, UT, United States

**3:45pm A 1-kW Day-and-Night Radiative Cooling System for Cold Water Generation**

**Technical Presentation.** IMECE2018-88495

*Ablimit Aili, Department of Mechanical Engineering University of Colorado Boulder, Boulder, CO, United States, Dongliang Zhao, University of Colorado Boulder, Boulder, CO, United States, Yao Zhai, Jiatao Lu, Dillon Kidd, Nicolas Seitz, Alexander Savage, Department of Mechanical Engineering University of Colorado Boulder, Boulder, CO, United States, Gang Tan, Department of Civil & Architectural Engineering University of Wyoming, Laramie, WY, United States, Xiaobo Yin, Department of Mechanical Engineering University of Colorado Boulder, Boulder, CO, United States, Ronggui Yang, University of Colorado, Boulder, CO, United States*

**4:06pm Dynamic Temperature Control via Actuation of a Deployable/Retractable Radiator**

**Technical Presentation.** IMECE2018-88891

*Rydge Mulford, Lance Hyatt, Samuel Salt, Ernest Lee, Brigham Young University, Provo, UT, United States, Vivek Dwivedi, NASA Goddard, Greenbelt, MD, United States, Matthew R. Jones, Brigham Young Univ, Provo, UT, United States, Brian D. Iverson, Brigham Young University, Provo, UT, United States*

**4:27pm Sub-Ambient Passive Daytime Radiative Cooling using a Directional Approach**

**Technical Presentation.** IMECE2018-89481

*Bikram Bhatia, Arny Leroy, Yichen Shen, Lin Zhao, Melissa Gianello, Duanhui Li, Tian Gu, Juejun Hu, Marin Soljagic, Massachusetts Institute of Technology, Cambridge, MA, United States, Evelyn Wang, MIT, Cambridge, MA, United States*

**4:48pm The Solid-State Electrocaloric Refrigeration With Unimorph Beam and its Analytical Model**

**Technical Paper Publication.** IMECE2018-88634

*Zhimin Sun, Qing-Ming Wang, William Slaughter, University of Pittsburgh, Pittsburgh, PA, United States*

**5:09pm Device-Level Thermodynamic Model for An Electrocaloric Cooler**

**Technical Presentation.** IMECE2018-86433

*Jie Gong, Carnegie Mellon University, Pittsburgh, PA, United States, Alan McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States*

**10-22 K9-2 COUPLED THERMAL TRANSPORT BY ELECTRONS, MAGNONS, AND PHONONS**

**10-22-1 K9-2 Coupled thermal transport by electrons, magnons, and phonons**

**Third Floor, David L. Lawrence Convention Center, Room 326 3:45pm - 5:30pm**

Session Chair: **Tengfei Luo**, University of Notre Dame, Notre Dame, IN, United States

Session Co-Chair: **Ruiqiang Guo**, Caltech, Pasadena, CA, United States

**3:45pm Crystalline Polymer Nanofibers with Ultra-high Thermal Conductivity and Strength**

**Invited Presentation.** IMECE2018-89242

*Sheng Shen, Carnegie Mellon University, Pittsburgh, PA, United States*

**4:27pm Magnon and Phonon Dispersion, Lifetime and Thermal Conductivity of Iron from Spin-Lattice Dynamics Simulations**

**Technical Presentation.** IMECE2018-86297

*Xin Wu, Yeyu Lu, Tengfei Luo, University of Notre Dame, Notre Dame, IN, United States*

**4:48pm Atomistic Simulations of Phononic and Magnonic Thermal Transport in Magnetic Materials**

**Technical Presentation.** IMECE2018-88860

*Yanguang Zhou, University of California, Los Angeles, Los Angeles, CA, United States, Julien Tranchdia, Sandia National Laboratories, Albuquerque, NM, United States, Yijun Ge, Timothy S Fisher, Jayathi Murthy, University of California, Los Angeles, Los Angeles, CA, United States*

**5:09pm Tuning Electronic Heat Transport in Graphene/Metal Heterostructures with Ultralow Thermal Conductivity**

**Technical Presentation.** IMECE2018-89400

*Bin Huang, Weidong Zheng, Yee Kan Koh, National University of Singapore, Singapore, Singapore*

**10-32 K11-1 CMS- COMBUSTION POWER SYSTEMS**

**10-32-1 CMS - Combustion Power System**

**Third Floor, David L. Lawrence Convention Center, Room 323 3:45pm - 5:30pm**

Session Chair: **Omid Askari**, Mississippi State University, Mississippi State, MS, United States

**3:45pm** An Integrated Design For A Portable Methanol Fuel Microcombustion-Thermoelectric Coupled Power Device

Technical Presentation. IMECE2018-88186

*Bhanu Prakash Reddy Guggilla, Alexander Rusted, Bruce Barrett, Ryan Moran, Navroop Kaur, Smitesh Bakrania, Rowan University, Glassboro, NJ, United States*

**4:06pm** Automated Engine Calibration Optimization Using Online Extremum Seeking

Technical Paper Publication. IMECE2018-87911

*Ripudaman Singh, University of Michigan, Ann Arbor, MI, United States, Andrew Mansfield, University of Michigan, Dept. of Mechanical Engineering, Ann Arbor, MI, United States, Margaret Wooldridge, Univ Of Michigan, Ann Arbor, MI, United States*

**4:27pm** Characteristics of a Non-Premixed Rotating Detonation Combustor Using Natural Gas-Hydrogen Blend at Elevated Air-Preheat Temperature and Backpressure

Technical Paper Publication. IMECE2018-88569

*Arnab Roy, National Energy Technology Laboratory-WVURC, Morgantown, WV, United States, Donald Ferguson, National Energy Technology Laboratory - DOE, Morgantown, WV, United States, Todd Sidwell, NETL, Morgantown, WV, United States, Peter Strakey, National Energy Technology Laboratory-DOE, Morgantown, WV, United States*

**4:48pm** Micro Combustor Development Using Hydrogen As Fuel

Technical Paper Publication. IMECE2018-88659

*Ronak Shah, ADIT, Anand, Gujarat, India, Digvijay Kulshreshtha, Nisarg Chaudhari, C K Pithawala College of Engineering and Technology, Surat, Gujarat, India*

**5:09pm** Performance and Emissions Analysis of Partially Pre-Mixed Charge Compression Ignition Combustion

Technical Paper Publication. IMECE2018-86410

*Charu V. Srivatsa, Jonathan Mattson, Christopher Depcik, University of Kansas, Lawrence, KS, United States*

## **10-42 K16-1: HEAT TRANSFER IN ELECTRONIC EQUIPMENT**

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**10-42-1 K16-1: Heat Transfer in Electronic Equipment - I**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 3:45pm - 5:30pm**

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Session Chair: **Seungbae Park**, Binghamton Univ, Binghamton, NY, United States

Session Co-Chair: **Hendrik PJ De Bock**, GE Global Research, Schenectady, NY, United States

**3:45pm** Two-Wavelength Thermorefectance and its Application in Temperature Measurement of Micro-Electronic Devices

Technical Paper Publication. IMECE2018-87989

*Hongjie Zhang, Sy-Bor Wen, Texas A&M University, College Station, TX, United States*

**4:06pm** Experimental Evaluation of a Dual Taper Manifold in a Thermosiphon Loop for Data Center Application

Technical Presentation. IMECE2018-88799

*Aranya Chauhan, RIT, Rochester, NY, United States, Satish Kandlikar, Rochester Institute of Technology, Rochester, NY, United States*

**4:27pm** Heat Transfer Analysis of a High Capacity Thermal Battery

Technical Presentation. IMECE2018-89187

*Mun Goung Jeong, KAIST, Daejeon, Korea (Republic), Jang-Hyeon Cho, Agency for Defense Development, Daejeon, Korea (Republic), Bong Jae Lee, KAIST, Daejeon, Korea (Republic)*

**4:48pm** Temperature Measurement of M.2 NVMe Solid State Drive using Infrared Thermometry

Technical Presentation. IMECE2018-89153

*Eung Chang Lee, Jinsung Rho, KAIST, Daejeon, Korea (Republic), Heeyoub Kang, Samsung Electronics, Suwon, Korea (Republic), Bong Jae Lee, KAIST, Daejeon, Korea (Republic)*

**5:09pm** Constructal Design Development in China

Technical Presentation. IMECE2018-88892

*Lingen Chen, Naval University of Engineering, Wuhan, China*

## **10-60 PROF. FRANK KREITH MEMORIAL SYMPOSIUM: ADVANCES IN HEAT TRANSFER, ENERGY SYSTEMS & SUSTAINABILITY**

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**10-60-3 Prof. Frank Kreith Memorial Symposium: Advances in Heat Transfer, Energy Systems & Sustainability - I**

**Third Floor, David L. Lawrence Convention Center, Room 324 3:45pm - 5:30pm**

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Session Chair: **John Maulbetsch**, Maulbetsch Consulting, Menlo Park, CA, United States

Session Co-Chair: **Satwindar Sadhal**, University of Southern California, Los Angeles, CA, United States, **Raj M. Manglik**, University Of Cincinnati, Cincinnati, OH, United States

**3:45pm** Toward Optimal Operation of Thermal Systems

Technical Presentation. IMECE2018-88920

*Yogesh Jaluria, Rutgers Univ, Piscataway, NJ, United States*

**4:06pm** "Challenges in the Heat and Mass Transfer Aspects of Comfort Cooling: Separating Sensible and Latent Loads - Material Constraints and New Opportunities"

Technical Presentation. IMECE2018-86719

*William Worek, Texas A&M University - Kingsville, Corpus Christi, TX, United States*

**4:27pm** INTERDISCIPLINARY NETWORK OF SUSTAINABLE ENGINEERING AND ITS APPLICATION TO BUILT ENVIRONMENT

Technical Presentation. IMECE2018-88789

*Cem Keskin, Ozyegin University, Istanbul, Turkey, M. Pinar Menguc, Ozyegin University, Cekmekoy, Istanbul, Turkey*

**4:48pm** Improvements in Distributed Power Generation and Waste Heat Recovery (including Data Center Cooling) based on Significantly Reduced Air-side Thermal Resistances and Enhanced Flow-boiling

Technical Presentation. IMECE2018-86344

*Amitabh Narain, Michigan Tech Univ, Houghton, MI, United States, Vibhu Vivek, Vivek Technologies LLC, Santa Clara, CA, United States, Hrishikesh Ranga Prasad, Nikhil Shinde, Soroush Sepahyar, Michigan Technological University, Houghton, MI, United States*

**5:09pm** Array Jet Impingement Onto High Porosity Thin Metal Foams at Zero Jet-to-Foam Spacing

Technical Paper Publication. IMECE2018-87915

*Prashant Singh, North Carolina State University, Raleigh, NC, United States, Mingyang Zhang, Virginia Tech, Blacksburg, VA, United States, Jaideep Pandit, Virginia Polytechnic Institute & State University, Blacksburg, VA, United States, Roop Mahajan, Virginia Tech, Blacksburg, VA, United States*

## TUESDAY, NOVEMBER, 13

### 10-64 HEAT TRANSFER AND THERMAL ENGINEERING PLENARIES

#### 10-64-1 Heat Transfer and Thermal Engineering Plenary

Third Floor, David L. Lawrence Convention Center, Room 306 8:00am - 8:45am

**8:00am** MULTISCALE MODELING of NANOPARTICLE TRANSPORT: APPLICATIONS TO TARGETED DRUG

Plenary Presentation. IMECE2018-90102

*Portonovo Ayyaswamy, University of Pennsylvania, Philadelphia, PA, United States*

### 10-64 HEAT TRANSFER AND THERMAL ENGINEERING PLENARIES

#### 10-64-2 Heat Transfer and Thermal Engineering Plenary

Third Floor, David L. Lawrence Convention Center, Room 306 9:00am - 9:45am

**9:00am** AEROSPACE THERMAL MANAGEMENT: CHALLENGES AND OPPORTUNITIES

Plenary Presentation. IMECE2018-90103

*Andrew Bicos, Boeing Co, Huntington Beach, CA, United States*

### 10-7 K6-6 RADIATIVE HEAT TRANSFER AND RADIATIVE PROPERTIES OF ENERGY SYSTEMS

#### 10-7-1 Analysis of Radiative Transfer in Energy Systems

Room 328 10:00am - 11:45am

Session Chair: *Matthew R. Jones, Brigham Young Univ, Provo, UT, United States*

**10:00am** Design and Evaluation of the Fresnel-Lens Based Solar Concentrator System Through a Statistical-Algorithmic Approach

Technical Paper Publication. IMECE2018-87023

*Hassan Qandil, Weihuan Zhao, University of North Texas, Denton, TX, United States*

**10:21am** Non-Gray Radiation Exchange: The Internal Fractional Function Reconsidered

Technical Paper Publication. IMECE2018-86386

*John Lienhard V, Massachusetts Institute of Technology, Cambridge, MA, United States*

**10:42am** Radiation Characterization of Packed Beds Using Artificial Neural Networks

Technical Presentation. IMECE2018-89013

*Hynn Hee Kang, Shima Hajimirza, Texas A&M University, College Station, TX, United States*

**11:03am** Orthogonal Function Extension to the Hottel Zone Method

Technical Presentation. IMECE2018-88771

*Daniel Vargner, University of Texas, Austin, TX, United States, Orsuke Ezekoye, Univ Of Texas, Austin, TX, United States*

**11:24am** Uncertainty in Optical Particulate Counters

Technical Presentation. IMECE2018-87781

*Jared Blanchard, Jacob Thomas, Nicholas J. Wallace, Connan Wu, Randy S. Lewis, Brigham Young University, Provo, UT, United States, Matthew R. Jones, Brigham Young Univ, Provo, UT, United States*

### 10-15 K8-1 FUNDAMENTALS OF BOILING AND CONDENSATION ? I

#### 10-15-1 Fundamentals of boiling and evaporation

Room 329 10:00am - 11:45am

Session Chair: *Vijay Dhir, Univ Of California/los Angeles, Los Angeles, CA, United States*

Session Co-Chair: *Diana-Andra Borca-Tasciuc, Rensselaer Polytech Instit, Troy, NY, United States, C. Thomas Avedisian, Cornell University, Ithaca, NY, United States*

**10:00am** Mechanism Interaction During Droplet Evaporation on Nanostructured Hydrophilic Surfaces

Technical Paper Publication. IMECE2018-87991

*Van P. Carey, University Of California, Berkeley, CA, United States, Claire K. Wemp, University of California, San Jose, CA, United States, Emma R. McClure, Samuel Cabrera, University of California, Berkeley, CA, United States*

**10:21am Nanoscale wetting and energy transmission at solid-liquid interfaces**

Technical Presentation. IMECE2018-89801

**John A. Tomko, Ashutosh Giri, David Olson, John Gaskins, University of Virginia, Charlottesville, VA, United States, Sean O'Malley, Rutgers University, Camden, NJ, United States, Patrick E. Hopkins, University of Virginia, Charlottesville, VA, United States**

**10:42am Origin and Evolution of Microlayer in a Vapor Bubble during Pool Boiling**

Technical Presentation. IMECE2018-88965

**An Zou, Manish Gupta, Shalabh Maroo, Syracuse University, Syracuse, NY, United States**

**11:03am Simulation of Nucleate Boiling With Interfacial Temperature Gradients and Sharp Interface**

Technical Paper Publication. IMECE2018-87998

**Satish Kandlikar, Isaac Perez-Raya, Rochester Institute of Technology, Rochester, NY, United States**

**11:24am Role and enhancement of micro-nucleation in annular flow-boiling**

Technical Presentation. IMECE2018-86343

**Amitabh Narain, Michigan Tech Univ, Houghton, MI, United States, Patcharapol Gorgitrattanakul, Michigan Technological University, Houghton, MI, United States, Ritunesh Kumar, Indian Institute of Technology, Indore, Indore, India, Hrishikesh Ranga Prasad, Sunil Mehendale, Soroush Sepahyar, Michigan Technological University, Houghton, MI, United States**

## **10-23 K9-3 PHONONIC CRYSTALS AND THERMOELECTRICS**

**10-23-1 K9-3 Phononic crystals and thermoelectrics - I**

**Room 330 10:00am - 11:45am**

Session Chair: **Yanliang Zhang, University of Notre Dame, Notre Dame, IN, United States**

Session Co-Chair: **Tianli Feng, Vanderbilt University/Oak Ridge National Laboratory, Oak Ridge, TN, United States**

**10:00am Lattice Thermal Conductivity of Nanostructured Thermoelectric Materials**

Technical Presentation. IMECE2018-87177

**Bo Fu, Guihua Tang, Xi'an Jiaotong University, Xi'an, Shaanxi, China**

**10:21am Thermal and Thermoelectric Transport in Additive Printed Nanostructured Flexible Thermoelectric Films**

Technical Presentation. IMECE2018-87729

**Yanliang Zhang, University of Notre Dame, Notre Dame, IN, United States, Tony Varghese, Boise State University, Boise, ID, United States, Nick Kempf, Mortaza Saeidi-Javash, University of Notre Dame, Notre Dame, IN, United States**

**10:42am Interatomic potential development for thermal conductivity prediction of materials: the complex binary compound Sb<sub>2</sub>Te<sub>3</sub>**

Technical Presentation. IMECE2018-88650

**Prabudhya Roy Chowdhury, Purdue University, West Lafayette, IN, United States, Tianli Feng, Vanderbilt University/Oak Ridge National Laboratory, Oak Ridge, TN, United States, Xiulin Ruan, Purdue Univ, West Lafayette, IN, United States**

**11:03am Thermoelectric Transport in Bismuth Telluride Nanoribbon with Surface Protection by Organic Molecule Coating**

Technical Presentation. IMECE2018-89557

**Wei Wu, Michael Pettes, University of Connecticut, Storrs, CT, United States**

**11:24am Thermal conductivity in CdO Modulation-Doped Single Lattice Films (MoDSiLFs)**

Technical Presentation. IMECE2018-89890

**Elizabeth Radue, University of Virginia, Charlottesville, VA, United States, Evan L. Runnerstrom, NCSU, Raleigh, NC, United States, Christina M. Rost, University of Virginia, Charlottesville, VA, United States, Brian F. Donovan, United States Naval Academy, Annapolis, MD, United States, Everett D. Grimley, James M. LeBeau, NCSU, Raleigh, NC, United States, Jon-Paul Maria, Penn State University, University Park, PA, United States, Patrick Hopkins, University of Virginia, Charlottesville, VA, United States**

## **10-33 K11-2 CMS- SPRAYS AND EMISSIONS**

**10-33-1 CMS - Sprays and Emissions**

**Third Floor, David L. Lawrence Convention Center, Room 320 10:00am - 11:45am**

Session Chair: **Mohsen Ghamari, Wilkes University, Wilkes Barre, PA, United States**

Session Co-Chair: **Mohsen Ayoobi, Wayne State University, Detroit, MI, United States**

**10:00am Cubic Formula for Determination of the Drop Size During Atomization of Liquid Jets in Co- and Cross-Flow of Air**

Technical Paper Publication. IMECE2018-86372

**Taewoo Lee, Arizona State Univ, Tempe, AZ, United States, Jung Eun Park, Arizona State University, Tempe, AZ, United States, Ryoichi Kurose, Kyoto University, Kyoto, Japan**

**10:21am Nitrogen-Bearing Emissions From Combustion of Raw and Torrefied Corn Straw in a Fixed-Bed Reactor**

Technical Paper Publication. IMECE2018-86612

**Xiaohan Ren, Shandong University, Jinan, Shandong, China, Emad Rokni, Northeastern University, BROOKLINE, MA, United States, Yu Liu, Zheng CUI, Shandong University, Jinan, Shandong, China, Yiannis Leventis, Northeastern Univ, Boston, MA, United States**

**10:42am** Influence of Injection Angle on Pollutant Emissions and Combustion Temperature on a CFM56-3 Engine

Technical Paper Publication. IMECE2018-87353

*Pedro C. Moreira, Universidade da Beira Interior - Departamento de Ciências Aeroespaciais, Covilhã, Portugal, francisco brojo, Universidade Da Beira Interior, Beira, Portugal*

**11:03am** Preliminary Development of a Measurement Standard Using a Research Simplex Atomizer

Technical Paper Publication. IMECE2018-87940

*Scott Leask, Alice Li, UCI Combustion Laboratory, Irvine, CA, United States, Vincent McDonell, University Of California, Irvine, CA, United States, Scott Samuelsen, Univ Of California, Irvine, CA, United States*

**11:24am** Thermal Conductivity of Colloidal Suspensions of Jet Fuel and Carbon-Based Nanoparticles and its Effect on Evaporation Rate

Technical Paper Publication. IMECE2018-88618

*Mohsen Ghamari, Ahmed Aboalhamayie, Wilkes University, Wilkes Barre, PA, United States*

**10-36 K13-1 HEAT TRANSFER IN MULTIPHASE SYSTEMS**

**10-36-1 K13-1 Heat Transfer in Multiphase Systems - I**

**Fourth Floor, David L. Lawrence Convention Center, Room 406 10:00am - 11:45am**

Session Chair: *Abhijit Mukherjee, California State University Northridge, Northridge, CA, United States*

**10:00am** Experimental Investigation on Heat Transfer Characteristics of Smooth Water Wall Tube of an Ultra-Supercritical CFB Boiler

Technical Paper Publication. IMECE2018-86137

*Wenyu Wang, Ziyu Liang, Li Wan, Dan Liu, Dong Yang, Xi'an Jiaotong University, Xi'an, China*

**10:21am** A Correlation for Maximum Heat Transfer to Cylinders and Spheres in Gas-Fluidized Beds

Technical Paper Publication. IMECE2018-86586

*Mirza Mohammed Shah, Engineering Research Associates, Redding, CT, United States*

**10:42am** General Correlation for Heat Transfer During Two-Component Gas-Liquid Flow in Horizontal Pipes

Technical Paper Publication. IMECE2018-86589

*Mirza Mohammed Shah, Engineering Research Associates, Redding, CT, United States*

**11:03am** A Correlation for Heat Transfer to Two-Component Gas-Liquid Flowing in Vertical Channels

Technical Paper Publication. IMECE2018-86590

*Mirza Mohammed Shah, Engineering Research Associates, Redding, CT, United States*

**11:24am** CFD Analysis of Direct Contact Condensation (DCC) of Subsonic Steam Jets in a Cross-Flow of Water Using a Two-Fluid Model

Technical Paper Publication. IMECE2018-87382

*Jayachandran K N, Indian Institute of Technology (IIT) Kharagpur, Kharagpur, West Bengal, India, Arnab Roy, Parthasarathi Ghosh, Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

**10-42 K16-1: HEAT TRANSFER IN ELECTRONIC EQUIPMENT**

**10-42-2 K16-1: Heat Transfer in Electronic Equipment - II**

**Third Floor, David L. Lawrence Convention Center, Room 327 10:00am - 11:45am**

Session Chair: *Seungbae Park, Binghamton Univ, Binghamton, NY, United States*

Session Co-Chair: *Hendrik PJ De Bock, GE Global Research, Schenectady, NY, United States*

**10:00am** Thermal Transport at Ga<sub>2</sub>O<sub>3</sub>/Metal Interfaces and Bulk Ga<sub>2</sub>O<sub>3</sub> Polymorphs

Technical Presentation. IMECE2018-86459

*Henry Aller, Xiaoxiao Yu, Andrew Gellman, Jonathan Malen, Carnegie Mellon University, Pittsburgh, PA, United States, Alan McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States*

**10:21am** Thermal Analysis of a Subscale Flux Focusing Magnetic Petri Dish

Technical Paper Publication. IMECE2018-86876

*Sina Moudareshmadi, Javad Khalesi, Josh Kadel, Wesley Williams, University of North Carolina at Charlotte, Charlotte, NC, United States*

**10:42am** Validation and Evaluation of Turbulence Models in Thermal Predictions of a Small Data Center Facility

Technical Paper Publication. IMECE2018-87479

*Beichao Hu, Long Phan, Cheng-xian Lin, Florida International University, Miami, FL, United States*

**11:03am** An Experimental Study on the Convective Heat Transfer Behaviour of Diamond Nanofluids in Electronic Cooling Applications

Technical Paper Publication. IMECE2018-87481

*Farzin Mashali, Tennessee Tech University, Cookeville, TN, United States, Ethan Languri, Tennessee Technological University, Cookeville, TN, United States, Jim Davidson, David Kerns, FemtoScience, Nashville, TN, United States, Fahad Alkhalidi, Tennessee Tech University, Cookeville, TN, United States*

**11:24am** Micron Variations of the Thermal Conductivity of Copper-Tin Intermetallics

Technical Presentation. IMECE2018-88551

*Matthias Daeumer, Scott Schiffres, SUNY Binghamton, Binghamton, NY, United States, Charles L. Arvin, IBM, Hopewell Junction, NY, United States*

Draft Program

## **10-7 K6-6 RADIATIVE HEAT TRANSFER AND RADIATIVE PROPERTIES OF ENERGY SYSTEMS**

### **10-7-2 Radiative Properties**

**Room 328 1:45pm - 3:30pm**

Session Chair: **Rydge Mulford**, Brigham Young University, Provo, UT, United States

**1:45pm** Directional Radiative Properties of Thin Polytetrafluoroethylene (PTFE) Sheets on A Silver Film  
Technical Presentation. IMECE2018-87882

**Peiyan Yang, Zhuomin Zhang**, Georgia Institute of Technology, Atlanta, GA, United States, **Chuyang Chen**, Georgia Tech, Atlanta, GA, United States

**2:06pm** How to Make Silica Aerogel Transparent?  
Technical Presentation. IMECE2018-88885

**Tiphaine Galy**, University of California, Los Angeles, Los Angeles, CA, United States, **Mu Du**, Xi'an Jiaotong University, Xi'an, China, **Guihua Tang**, Xi'an Jiaotong University, Xi'an, China, **Laurent Pilon**, Univ Of California/los Angeles, Los Angeles, CA, United States

**2:27pm** Selective Thermal Radiation from Nanoribbons  
Technical Presentation. IMECE2018-89679

**Mahmoud Elzouka, Ravi Prasher**, Lawrence Berkeley National Laboratory, Berkeley, CA, United States

**2:48pm** Measurement of the Radiative Surface Properties of Opaque Materials  
Technical Presentation. IMECE2018-87711

**Christopher Brooks**, Brigham Young University, Provo, UT, United States, **Matthew R. Jones**, Brigham Young Univ, Provo, UT, United States

## **10-15 K8-1 FUNDAMENTALS OF BOILING AND CONDENSATION ? I**

### **10-15-2 K8-1 Fundamentals of boiling**

**Room 329 1:45pm - 3:30pm**

Session Chair: **Amitabh Narain**, Michigan Tech Univ, Houghton, MI, United States

Session Co-Chair: **Isaac Perez-Raya**, Rochester Institute of Technology, Rochester, NY, United States

**1:45pm** A novel multi-scale wick structure for delayed critical heat flux in microchannel flow boiling process  
Technical Presentation. IMECE2018-88292

**Mojtaba Hosseinnia**, Michigan Tech University, HOUGHTON, MI, United States, **Sajjad Bigham**, Michigan Technological University, Houghton, MI, United States

**2:06pm** Boiling heat transfer on a two-tier copper structure of nanowires and microgrooves  
Technical Presentation. IMECE2018-88825

**Guanglei Chen, Calvin Hong Li**, Villanova University, Villanova, PA, United States

**2:27pm** Molecular Dynamics Simulation of Explosive Boiling on Concave Nanostructured Surface  
Technical Paper Publication. IMECE2018-86965

**Pengfei Ji, Mengzhe He, Yiming Rong**, Southern University of Science and Technology, Shenzhen, Guangdong, China, **Yuwen Zhang**, University Of Missouri, Columbia, MO, United States, **Yong Tang**, South China University of Technology, Guangzhou, Guangdong, China

**2:48pm** Investigation of Bubble Departure Radius in Subcooled Pool Boiling Under Microgravity Condition  
Technical Paper Publication. IMECE2018-87741

**Xueli Wang**, Xi'an Jiaotong University, xi'an, China, **Zan Wu**, Lund University, Lund, OO, Sweden, **Jinjia Wei**, Xi'an Jiaotong University, xi'an, Select State/Province, China, **Bengt Sundén**, Lund University, Lund, Sweden

**3:09pm** Multi-fractal analysis of surface temperature time series to predict the Critical Heat Flux  
Technical Presentation. IMECE2018-89500

**Ankit Saini**, University of Minnesota, Minneapolis, MN, United States, **Vinod Srinivasan**, UMN, Minneapolis, MN, United States

## **10-23 K9-3 PHONONIC CRYSTALS AND THERMOELECTRICS**

### **10-23-2 K9-3 Phononic crystals and thermoelectrics - II**

**Room 330 1:45pm - 3:30pm**

Session Chair: **Tianli Feng**, Vanderbilt University/Oak Ridge National Laboratory, Oak Ridge, TN, United States

Session Co-Chair: **Ruijun Guo**, Caltech, Pasadena, CA, United States

**1:45pm** Anisotropic thermal transport in single-crystal group-III nitride films extrinsically induced by highly-oriented dislocations

Technical Presentation. IMECE2018-89505

**Bo Sun**, National University of Singapore, Singapore, Singapore, **Georg Haunschild**, Technical University of Munich, Garching, Germany, **Carlos Polanco**, ORNL, oak ridge, TN, United States, **James (Zi-Jian) Ju**, Technical University of Munich, Garching, Select State/Province, Germany, **Lucas Lindsay**, Oak Ridge National Lab, Oak Ridge, TN, United States, **Gregor Koblmüller**, Technical University of Munich, Garching, Select State/Province, Germany, **Yee Kan Koh**, National University of Singapore, Singapore, Singapore

**2:06pm** Probing the lower limit of lattice thermal transport in one-dimensional phononic crystals  
Technical Presentation. IMECE2018-89708

**Pranay Chakraborty**, University of Nevada, Reno (mechanical Department), Reno, NV, United States, **Lei Cao, Yan Wang**, University of Nevada, Reno, Reno, NV, United States

**2:27pm** Investigations of Encapsulated Phase Change Material in Boron Nitride Nanotubes  
Technical Presentation. IMECE2018-89778

**Nastaran Barhemmati-Rajab, Weihuan Zhao**, University of North Texas, Denton, TX, United States

**2:48pm Thermal Conductivity Measurement of Methylammonium Lead Iodide Based Ruddlesden Popper Perovskite Phases**

**Technical Presentation.** IMECE2018-87814

**Alexander D. Christodoulides**, Carnegie Mellon University, Pittsburgh, PA, United States, **Peijun Guo**, Argonne National Laboratory, Lemont, IL, United States, **Constantinos Stoumpos**, **Mercouri G. Kanatzidis**, Northwestern University, Evanston, IL, United States, **Richard Schaller**, Argonne National Laboratory/ Northwestern University, Lemont, IL, United States, **Jonathan Malen**, Carnegie Mellon University, Pittsburgh, PA, United States

## **10-34 K11-3 CMS- APPLIED COMBUSTION**

**10-34-1 CMS - Applied Combustion - Modeling Heat Transfer and Combustion**

**Third Floor, David L. Lawrence Convention Center, Room 326 1:45pm - 3:30pm**

Session Chair: **Mehdi Esmaeilpour**, Marshall University, Huntington, WV, United States

Session Co-Chair: **Kris Jorgensen**, A. O. Smith, Brookfield, WI, United States

**1:45pm Numerical Modeling of Water Impingement and Heat Transfer With Solid Slabs During Secondary Cooling in a Continuous Caster**

**Technical Paper Publication.** IMECE2018-86691

**Haibo Ma**, **Kaile Tang**, Purdue University Northwest CIVS, Hammond, IN, United States, **Rui Lin**, **Michael Lowry**, ArcelorMittal, East Chicago, IN, United States, **Armin Silaen**, Purdue University Northwest CIVS, Hammond, IN, United States, **Chenn Zhou**, Purdue University Calumet, Hammond, IN, United States

**2:06pm Optimization of Heat Transfer Process in a Walking Beam Reheat Furnace Using Computational Fluid Dynamics**

**Technical Paper Publication.** IMECE2018-88117

**Yuchao Chen**, Purdue University Northwest, Hammond, IN, United States, **Armin Silaen**, Purdue University Northwest CIVS, Hammond, IN, United States, **Nicholas Walla**, Purdue University Northwest, Hammond, IN, United States, **Kurt Johnson**, ArcelorMittal Global Research and Development, East Chicago, IN, United States, **Chenn Zhou**, Purdue University Calumet, Hammond, IN, United States

**2:27pm CFD Modelling of NOx and Soot Formation in Aluminum Anode Baking Furnace**

**Technical Paper Publication.** IMECE2018-88390

**Abdul Raouf Tajik**, Khalifa University of Science and Technology, Masdar City, Abu Dhabi, United Arab Emir., **Tariq Shamim**, University of Michigan-Flint, Flint, MI, United States, **Ahmed Ghoniem**, Massachusetts Inst Of Technology, Cambridge, MA, United States, **Rashid K. Abu Al-Rub**, Khalifa University of Science and Technology, Abu Dhabi, Abu Dhabi, United Arab Emir.

**2:48pm Modeling for Mineral Redistribution of Coal Blending During Pulverized Coal Combustion**

**Technical Paper Publication.** IMECE2018-87834

**Md. Saifujaman**, Arkansas State University, Jonesboro, AR, United States, **Kwangkook Jeong**, Arkansas State University, State University, AR, United States, **Shinku Lee**, Doosan Heavy Industries & Construction Co., LTD, Gyeongnam, Korea (Republic)

**3:09pm CFD Analysis of Premixed Combustion in a Two Stroke Polygon Engine**

**Technical Presentation.** IMECE2018-89361

**Christian Mendez**, Calif State Polytechnic Univ at Pomona, Pomona, CA, United States, **Kevin Anderson**, California State Polytech Univ, Pomona, CA, United States

## **10-36 K13-1 HEAT TRANSFER IN MULTIPHASE SYSTEMS**

**10-36-2 K13-1 Heat Transfer in Multiphase Systems - II**

**Fourth Floor, David L. Lawrence Convention Center, Room 406 1:45pm - 3:30pm**

Session Chair: **Scott Thompson**, Auburn University, Auburn, AL, United States

**1:45pm Effect of Particle-Laden Flow on Heat Transfer**

**Technical Presentation.** IMECE2018-88005

**Sarah R Masters**, Pennsylvania State University, State College, PA, United States, **Michael Monahan Jr.**, Penn State University, State College, PA, United States

**2:06pm Functional Coating Durability**

**Technical Presentation.** IMECE2018-88110

**Muhammad Jahidul Hoque**, University of Illinois Urbana-Champaign, Urbana, IL, United States, **Longnan Li**, University of Illinois, Urbana, IL, United States, **Nenad Miljkovic**, University of Illinois At Urbana-Champaign, Urbana, IL, United States

**2:27pm Three-Dimensional Multiple-Relaxation-Time Lattice Boltzmann Simulation of Vapor Condensation on Subcooled Wall**

**Technical Paper Publication.** IMECE2018-88490

**Wandong Zhao**, Nanchang University, Nanchang, Jiangxi, China, **Ben Xu**, University of Texas Rio Grande Valley, Edinburg, TX, United States, **Ying Zhang**, Nanchang University, Nanchang, Jiangxi, China

**2:48pm Temperature profile across liquid-vapor interface with phase change: Results from molecular dynamics simulations**

**Technical Presentation.** IMECE2018-89202

**Arif Rokoni**, Drexel University, Philadelphia, PA, United States, **Ying Sun**, Mechanical Engineering, Drexel University, Philadelphia, PA, United States

**Draft Program**

**3:09pm Numerical Study Of Bubble Dynamics During Nucleate Pool Boiling Of Nanofluids**

Technical Presentation. IMECE2018-89266

*Abhijit Mukherjee, Goutham Kumar Reddy Burla, California State University Northridge, Northridge, CA, United States, Yash Jawanjal, Indian Institute of Technology Bombay, Mumbai, Maharashtra, India*

**10-53 K20-3 APPLICATIONS OF COMPUTATIONAL HEAT TRANSFER**

**10-53-1 Applications of Computational Heat Transfer: Convection**

**Third Floor, David L. Lawrence Convention Center, Room 327 1:45pm - 3:30pm**

Session Chair: **Samuel Subia**, Sandia National Laboratories, Albuquerque, NM, United States

Session Co-Chair: **Aaron Wemhoff**, Villanova University, Villanova, PA, United States

**1:45pm Numerical Modeling for a Supercritical CO<sub>2</sub>-Liquid Sodium Hybrid Compact Heat Exchanger**

Technical Paper Publication. IMECE2018-86682

*Sean Kissick, Hailei Wang, Oregon State University, Corvallis, OR, United States*

**2:06pm Calibration of External Heat Transfer Coefficients During Cooling of a Partially-Filled Water Tank Using Measured Temperature-Time Data**

Technical Paper Publication. IMECE2018-86116

*Vishal Ramesh, Ohio State University, Columbus, OH, United States, Sandip Mazumder, Ohio State Univ, Columbus, OH, United States, Gurpreet Matharu, Dhaval Vaishnav, Syed Ali, Don Lawrence, Jatin Desai, Mohsen Ehteshami, Ford Motor Company, Dearborn, MI, United States*

**2:27pm Preliminary Heat Transfer Simulation Model of a Novel Dynamic Thermal Ablation Probe**

Technical Paper Publication. IMECE2018-86874

*Joseph Nakao, Yen-Lin Han, Seattle University, Seattle, WA, United States*

**2:48pm Analysis of Flow and Thermal Stress in a Blast Furnace Blowpipe**

Technical Paper Publication. IMECE2018-88468

*Yuhan Cui, Justina Lee, Nicholas Walla, Purdue University Northwest, Hammond, IN, United States, Armin Silaen, Purdue University Northwest CIVS, Hammond, IN, United States, Dale Goodloe, ArcelorMittal, East Chicago, IN, United States, Chenn Zhou, Purdue University Calumet, Hammond, IN, United States*

**3:09pm Numerical Heat Transfer Study of Combined Water and Air Cooling in a High Speed Electric Motor**

Technical Presentation. IMECE2018-89401

*Jun Lin, Calif. State Polytechnic Univ. at Pomona, Pomona, CA, United States, Kevin Anderson, California State Polytech Univ, Pomona, CA, United States*

**10-6 K6-5 THERMAL MANAGEMENT OF BATTERY SYSTEMS**

**10-6-2 Capacitors**

**Room 407 3:45pm - 5:30pm**

Session Chair: **Leitao Chen**, Rice University, Houston, TX, United States

**3:45pm Heat generation rate measurements in hybrid supercapacitors devices**

Technical Presentation. IMECE2018-88886

*Obaidallah Munteshari, Jonathan Lau, Ampol Likitchatchawankun, Bing-Ang Mei, Christopher Choi, Bruce Dunn, University of California, Los Angeles, Los Angeles, CA, United States, Laurent Pilon, Univ Of California/los Angeles, Los Angeles, CA, United States*

**4:06pm Heat Generation in All-Solid-State Supercapacitors with Graphene Electrodes and Gel Electrolytes**

Technical Presentation. IMECE2018-88899

*Ampol Likitchatchawankun, University of California, Los Angeles, Los Angeles, CA, United States, Arpan Kundu, Purdue University, West Lafayette, IN, United States, Obaidallah Munteshari, University of California, Los Angeles, Los Angeles, CA, United States, Timothy Fisher, UCLA, Los Angeles, CA, United States, Laurent Pilon, Univ Of California/los Angeles, Los Angeles, CA, United States*

**4:27pm Continuum modeling of heat generation in porous electrical double-layer capacitors during galvanostatic charge/discharge**

Technical Presentation. IMECE2018-88903

*Arpan Kundu, Purdue University, West Lafayette, IN, United States, Laurent Pilon, Univ Of California/los Angeles, Los Angeles, CA, United States, Timothy Fisher, UCLA, Los Angeles, CA, United States*

**10-10 K6-9 TWO PHASE TRANSPORT IN ENERGY SYSTEMS AND NON-EQUILIBRIUM AND DYNAMIC ENERGY SYSTEMS**

**10-10-1 K6-9 Two Phase Transport in Energy Systems and Non-Equilibrium and Dynamic Energy Systems**

**Room 328 3:45pm - 5:30pm**

Session Chair: **david pratt**, USAF, wpafb, OH, United States

**3:45pm Calculation of Evaporation From Fukushima NPP Spent Fuel Pools**

Technical Paper Publication. IMECE2018-86561

*Mirza Mohammed Shah, Engineering Research Associates, Redding, CT, United States*

**4:06pm** An Influence of the Numerical Modeling of the Transition Between the Stator and Rotor on the Thermodynamic Condensation Loss in the Low-Pressure Part of a Steam Turbine

Technical Paper Publication. IMECE2018-86571

*Guk-choi Jun*, Czech Technical University in Prague, Prague, Czech Republic, *Lukas Mrozek*, University of West Bohemia, Pilsen, Czech Republic

**4:27pm** Pool Boiling Heat Transfer of N-Pentane and Acetone on Nanostructured Surfaces by Electrophoretic Deposition

Technical Paper Publication. IMECE2018-87752

*Zan Wu*, *Anh Duc Pham*, *Zhen Cao*, Lund University, Lund, OO, Sweden, *Cathrine Albèr*, *Peter Falkman*, *Tautgirdas Ruzgas*, Malmö University, Malmö, Select State/Province, Sweden, *Bengt Sundén*, Lund University, Lund, Sweden

**4:48pm** Supply Air Temperature Prediction in an Air-Handling Unit Using Artificial Neural Network

Technical Paper Publication. IMECE2018-88507

*Nikita R Sukthankar*, *Abhishek Uday Walekar*, University of Texas, Arlington, Arlington, TX, United States, *Dereje Agonafer*, University of Texas At Arlington, Arlington, TX, United States

**5:09pm** Numerical Study on the Performance Characteristics of Cylindrical Heat Pipes With Differing Wick Type

Technical Paper Publication. IMECE2018-86607

*Mahboobe Mahdavi*, *Saeed Tiari*, *Ajaysinh B. Solanki*, *Vivek Pawar*, Gannon University, Erie, PA, United States

**10-15 K8-1 FUNDAMENTALS OF BOILING AND CONDENSATION ? I**

**10-15-3 K8-1 Fundamentals of Boiling, Evaporation, and Condensation**

**Room 329 3:45pm - 5:30pm**

Session Chair: *Diana-Andra Borca-Tasciuc*, Rensselaer Polytech Instit, Troy, NY, United States

Session Co-Chair: *Navdeep Dhillon*, California State University Long Beach, Long Beach, CA, United States

**3:45pm** Electrowetting-induced rapid coalescence and shedding of droplets during condensation of moist air

Technical Presentation. IMECE2018-88973

*Enakshi Wikramanayake*, The University of Texas At Austin, Austin, TX, United States, *Vaibhav Bahadur*, University of Texas At Austin, Austin, TX, United States

**4:06pm** Hierarchical Microporous Surfaces for Enhancing Capillary Boiling Heat Transfer

Technical Presentation. IMECE2018-87270

*Rongfu Wen*, *Shanshan Xu*, *Yung-Cheng Lee*, University of Colorado Boulder, Boulder, CO, United States, *Ronggui Yang*, University of Colorado, Boulder, CO, United States

**4:27pm** Producing Syngas from Glycerol by Film Boiling

Technical Presentation. IMECE2018-87613

*Pushan Sharma*, *C. Thomas Avedisian*, *Jordan D Brunson*, Cornell University, Ithaca, NY, United States, *Wing Tsang*, National Institute of Standards and Technology, Gaithersburg, MD, United States, *Ivan Keresztes*, Cornell University, Ithaca, NY, United States

**4:48pm** Theoretical Model of Droplets Motions on Solid Surface With Radial Wettability and Evaporation Rate Gradients

Technical Paper Publication. IMECE2018-87890

*Yanjie Yang*, *Zan Wu*, Lund University, Lund, Select State/Province, Sweden, *Xiaoqian Chen*, National University of Defense Technology, Changsha, China, China, *Bengt Sundén*, Lund University, Lund, Sweden, *Yiyong Huang*, National University of Defense Technology, Changsha, China

**5:09pm** Molecular Simulation of Steady-state Evaporation and Condensation in the Presence of a Non-condensable Gas

Technical Presentation. IMECE2018-86180

*Zhi Liang*, California State University, Fresno, Clovis, CA, United States, *Pawel Keblinski*, RPI, Troy, NY, United States

**10-25 K9-5 MICRO/NANOSCALE PHASE CHANGE HEAT TRANSFER**

**10-25-1 K9-5 Micro/nanoscale phase change heat transfer - I**

**Room 310 3:45pm - 5:30pm**

Session Chair: *Dong Liu*, University of Houston, Houston, TX, United States

Session Co-Chair: *Tengfei Luo*, University of Notre Dame, Notre Dame, IN, United States

**3:45pm** Fast Evaporation from Single Graphene Nanopore

Technical Presentation. IMECE2018-89652

*Siyang Xiao*, Boston University, Allston, MA, United States, *Chuanhua Duan*, Boston University, Boston, MA, United States

**4:06pm** Effects of Size, Shape and Porosity on Evaporation from Nanopores

Technical Presentation. IMECE2018-89669

*Haowen Chen*, Department of Mechanical Engineering, Boston University, Boston, MA, United States, *Chuanhua Duan*, Boston University, Boston, MA, United States

**4:27pm** Computational Study Of Thermodynamics And Transport Of Water Confined Between Graphene

Technical Presentation. IMECE2018-89864

*Ujash Shah*, UCLA, LA, CA, United States, *Timothy Fisher*, UCLA, Los Angeles, CA, United States

**4:48pm**      **Molecular dynamics Simulation of Thin-Film Evaporation from Nanocoated Surfaces: An Investigation of the Role of Surface Wettability Interfacial thermal resistance on the Evaporate Rate**

**Technical Presentation.** IMECE2018-90017

*Binjian Ma, Washington University In St. Louis, College Station, TX, United States, Li Shan, Washington University In St. Louis, St. Louis, MO, United States, Baris Dogruoz, Cisco Systems Inc., Santa Clara, CA, United States, Damena Agonafer, Washington University in St. Louis, Saint Louis, MO, United States*

**5:09pm**      **Fundamental Mechanisms of Evaporation Kinetics of Non-Spherical Microdroplets Confined by Asymmetric Micropillar Structures**

**Technical Presentation.** IMECE2018-90018

*Li Shan, Washington University In St. Louis, St. Louis, MO, United States, Binjian Ma, Washington University In St. Louis, College Station, TX, United States, Baris Dogruoz, Cisco Systems Inc., Santa Clara, CA, United States, Damena Agonafer, Washington University in St. Louis, Saint Louis, MO, United States*

### 10-34 K11-3 CMS- APPLIED COMBUSTION

**10-34-2 CMS - Applied Combustion - Improving System Performance**

**Third Floor, David L. Lawrence Convention Center, Room 326      3:45pm - 5:30pm**

Session Chair: **Kris Jorgensen, A. O. Smith, Brookfield, WI, United States**

Session Co-Chair: **Mehdi Esmailpour, Marshall University Huntington, WV, United States**

**3:45pm**      **Correlating Thermal Characteristics From Flow-Reactor Experiments With Primary Reference Fuel**

**Technical Paper Publication.** IMECE2018-88042

*Jun-Chun Wong, Super Micro Computer, Inc., San Jose, CA, United States, Lea Der Chen, Texas A&M University - Corpus Christi, Corpus Christi, TX, United States*

**4:06pm**      **Influence of Renewable Gas Addition to Natural Gas on the Combustion Performance of Cooktop Burners**

**Technical Paper Publication.** IMECE2018-87932

*Yan Zhao, Shiny Choudhury, UCI Combustion Laboratory, Irvine, CA, United States, Vincent McDonell, University Of California, Irvine, CA, United States*

**4:27pm**      **Preheat Limits in Practical Combustor Design: Experiments and Simulations**

**Technical Paper Publication.** IMECE2018-88111

*Aleksandr Fridlyand, Brian Sutherland, Paul Glanville, Gas Technology Institute, Des Plaines, IL, United States*

**4:48pm**      **Water/Steam Injection for NOx Reduction in Process Burners**

**Technical Paper Publication.** IMECE2018-88688

*Steve Londerville, Coen, Hayward, CA, United States, Kevin Anderson, Coen, Sacramento, CO, United States, Charles Baukal, John Zink Co. LLC, Tulsa, OK, United States, Wes Bussman, John Zink Hamworthy Combustion, Tulsa, OK, United States*

**5:09pm**      **Infrared Thermography to Measure Heat Transfer of a Heated Curved Thin Sheet**

**Technical Paper Publication.** IMECE2018-86172

*Gaofeng Wang, Liang Zhong, Zhejiang University, Hangzhou, China, Yifan Xia, Zhejiang University, Hangzhou, Zhejiang, China*

### 10-39 K14-1 GAS TURBINE HEAT TRANSFER AND COOLING

**10-39-1 Gas Turbine Heat Transfer and Cooling**

**Fourth Floor, David L. Lawrence Convention Center, Room 405      3:45pm - 5:30pm**

Session Chair: **Stephen Lynch, Penn State University, University Park, PA, United States**

Session Co-Chair: **Andrew Nix, West Virginia University, Morgantown, WV, United States**

**3:45pm**      **Effect of Nozzle-to-Target Spacing on Fin Effectiveness and Convective Heat Transfer Coefficient for Array Jet Impingement Onto Novel Micro-Roughness Structures**

**Technical Paper Publication.** IMECE2018-86501

*Prashant Singh, North Carolina State University, Raleigh, NC, United States, Mingyang Zhang, Virginia Tech, Blacksburg, VA, United States, Shoaib Ahmed, Srinath Ekkad, North Carolina State University, Raleigh, NC, United States*

**4:06pm**      **Simulation of Film Cooling Heat Transfer and Simulation Improvement With a Modified DES Turbulence Model**

**Technical Paper Publication.** IMECE2018-86887

*Feyan Yu, The Pennsylvania State University, State College, PA, United States, Savas Yavuzkurt, Penn State University, University Pk, PA, United States*

**4:27pm**      **Large Eddy Simulations of Discrete Film Cooling with Different Freestream Turbulence Levels**

**Technical Presentation.** IMECE2018-89763

*Yousef Kanani, Sumanta Acharya, Illinois Institute of Technology, Chicago, IL, United States*

**4:48pm**      **Large-Eddy Simulations of Low Pressure Turbine Endwall Flow and Heat Transfer**

**Technical Paper Publication.** IMECE2018-87876

*Stephen Lynch, Penn State University, University Park, PA, United States*

**5:09pm**      **A Novel Air-Air Heat Exchanger Design and Experimental Validation for Aero-Engines**

**Technical Paper Publication.** IMECE2018-87169

*Yinlong Liu, Yanchen Fu, Haoran Huang, Jie Wen, Guoqiang Xu, Beihang University, Beijing, China*

Draft Program

## **10-40 K15-1 TRANSPORT PHENOMENA IN MANUFACTURING AND MATERIALS PROCESSING**

### **10-40-2 K15-1 Transport Phenomena in Manufacturing and Materials Processing - II**

**Fourth Floor, David L. Lawrence Convention Center, Room 406 3:45pm - 5:30pm**

Session Chair: **Patrick Mensah**, *Southern University, Baton Rouge, LA, United States*

Session Co-Chair: **Ying Sun**, *Mechanical Engineering, Drexel University, Philadelphia, PA, United States*

#### **3:45pm Thermal Stress Associated With Non-Fourier Heat Conduction in Femtosecond Laser Heating of Multilayer Metallic Films**

Technical Paper Publication. IMECE2018-86144

**Swarup Bag**, *IIT Guwahati, Guwahati, India*, **M. Ruhul Amin**, *Montana State Univ, Bozeman, MT, United States*

#### **4:06pm A study of photo-thermal-fluids transport phenomena with Marangoni effect of laser micro-patterning process**

Technical Presentation. IMECE2018-88808

**Ming-Tsang Lee**, *National Tsing Hua University, Hsinchu, Taiwan*

#### **4:27pm An Experimental Setup for Multiple Air Jet Impingement Over a Surface**

Technical Paper Publication. IMECE2018-87995

**Flávia Barbosa**, **Joao Silva**, *University of Minho, Guimarães, Select State/Province, Portugal*, **Leandro Ribeiro**, *University of Minho, Guimarães, Portugal*, **Senhorinha Teixeira**, **Delfim Soares**, *University of Minho, Guimarães, Select State/Province, Portugal*, **Duarte Santos**, *Bosch Car Multimedia SA, Braga, Select State/Province, Portugal*, **Maria Cerqueira**, *Physics Department, Braga, Portugal*, **Jose Teixeira**, *University of Minho, Guimarães, Portugal*

## **10-53 K20-3 APPLICATIONS OF COMPUTATIONAL HEAT TRANSFER**

### **10-53-2 Applications of Computational Heat Transfer: Industrial Applications**

**Third Floor, David L. Lawrence Convention Center, Room 327 3:45pm - 5:30pm**

Session Chair: **Samuel Subia**, *Sandia National Laboratories, Albuquerque, NM, United States*

Session Co-Chair: **Aaron Wemhoff**, *Villanova University, Villanova, PA, United States*

#### **3:45pm Study on Cutting Temperature Modeling of Machined Workpiece in End Milling In-Situ TiB<sub>2</sub>/7050Al MMCs**

Technical Paper Publication. IMECE2018-87319

**Yifeng Xiong**, *Northwestern Polytechnical University, Xi'an, China*, **Wenhu Wang**, **Ruisong Jiang**, *Northwestern Polytechnical University, Xi'an, Shaanxi, China*, **Kunyang Lin**, *Northwestern Polytechnical University, Xian, Shaanxi, China*

#### **4:06pm Air Flow Velocity Field Validation and Turbulence Studies on a Single Rack Model in Data Centers**

Technical Paper Publication. IMECE2018-86575

**Long Phan**, **Beichao Hu**, **Cheng-xian Lin**, *Florida International University, Miami, FL, United States*

#### **4:27pm CFD Model of the Turboprop Engine Hot Part: Bay Cooling**

Technical Paper Publication. IMECE2018-87066

**Goran Simeunovic**, **Petr Hatschbach**, **Luka? Popelka**, *CTU in Prague, Prague, Czech Republic*

#### **4:48pm Combined Computational and Experimental Analysis of Cooldown of a Surrogate Engine Mount Assembly**

Technical Paper Publication. IMECE2018-87139

**Navni N Verma**, **Andrei Iacob**, *Ohio State University, Columbus, OH, United States*, **Sandip Mazumder**, *Ohio State Univ, Columbus, OH, United States*, **Ahmet Selamet**, *The Ohio State University, Columbus, OH, United States*

#### **5:09pm Dynamic numerical simulation of heat transfer and fluid flow in Sustainable Farming Compartment**

Technical Presentation. IMECE2018-89254

**Jae Sung Park**, **Siamak Mirfendereski**, *University of Nebraska-Lincoln, Lincoln, NE, United States*, **M. Sina Mousavi**, **Jongwan Eun**, *University of Nebraska-Lincoln, Omaha, NE, United States*

## **WEDNESDAY, NOVEMBER, 14**

## **10-16 K8-2 FUNDAMENTALS OF SINGLE PHASE CONVECTION**

### **10-16-1 K8-2 Fundamentals of Single Phase Convection**

**Room 331 10:00am - 11:45am**

Session Chair: **Patrick Oosthuizen**, *Queen's University, Kingston, QC, Canada*

Session Co-Chair: **Chris Kobus**, *Oakland Univ, Rochester, MI, United States*, **Diana-Andra Borca-Tasciuc**, *Rensselaer Polytech Instit, Troy, NY, United States*

#### **10:00am Measurement of Heat Transfer Coefficient in Interaction Zone of Multiple Liquid Jet Impingement**

Technical Presentation. IMECE2018-88888

**Chaitanya Ghodake**, *Bharat Forge, Pune, maharashtra, India*

#### **10:21am Utilizing the Integral Technique to Determine the Similarity Variable in Classical Heat Transfer Problems: Thermal Boundary Layer Theory**

Technical Paper Publication. IMECE2018-88662

**Chris Kobus**, *Oakland Univ, Rochester, MI, United States*

#### **10:42am Numerical Study on Apparent Permeability of Porous Media in Slip Gas Flows Based on Lattice Boltzmann Method**

Technical Paper Publication. IMECE2018-87152

**Zhenyu Liu**, **Zhiyu Mu**, **Huiying Wu**, *Shanghai Jiao Tong University, Shanghai, China*

**11:03am** **Nonlinear Analysis of Convection in Ferromagnetic Liquids: Effect of Rotation**  
Technical Paper Publication. IMECE2018-87367  
*Anthony Christy Melson, G. N. Sekhar, BMS College of Engineering, Bengaluru, Karnataka, India*

**11:24am** **Experimental Investigation of Vapor Compression Cycle Under Influence of Magnetohydrodynamic Force**  
Technical Paper Publication. IMECE2018-88528  
*NIKHIL SHRIKANT MANE, PVPIT, Budhgaon, sangli, maharashtra, India, Narayanrao Hargude, RIT Sakharale, Budhgaon Maharashtra, India, Nutan Hargude, Adarsh Collge, Vita, Sangli, Maharashtra, India*

## **10-25 K9-5 MICRO/NANOSCALE PHASE CHANGE HEAT TRANSFER**

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**10-25-2 K9-5 Micro/nanoscale phase change heat transfer - II**

**Room 329 10:00am - 11:45am**

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Session Chair: **Chuanhua Duan**, Boston University, Boston, MA, United States

Session Co-Chair: **Dong Liu**, University of Houston, Houston, TX, United States

**10:00am** **Local measurement of the evaporative heat transfer coefficient in thin films using Frequency Domain Thermorefectance**  
Technical Presentation. IMECE2018-89603  
*Xiaoman Wang, Xiaoyue Zhao, Carnegie Mellon University, Pittsburgh, PA, United States, Aran McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States, Jonathan Malen, Carnegie Mellon University, Pittsburgh, PA, United States*

**10:21am** **Interfacial Defrosting**  
Technical Presentation. IMECE2018-86939  
*Shreyas Chavan, Kazi Fazle Rabbi, Thomas Foulkes, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Kalyan Boyina, University of Illinois, Urbana, IL, United States, Robert Pilawa-Podgurski, Nenad Miljkovic, University of Illinois at Urbana-Champaign, Urbana, IL, United States*

**10:42am** **Hybrid Surface Derived from PDMS Stamping**  
Technical Presentation. IMECE2018-88106  
*Muhammad Jahidul Hoque, University of Illinois Urbana-Champaign, Urbana, IL, United States, Seok Kim, Nenad Miljkovic, University of Illinois at Urbana-Champaign, Urbana, IL, United States*

**11:03am** **Thermal Transport Crossover from Crystalline to Partial-crystalline Partial-liquid State**  
Technical Presentation. IMECE2018-88862  
*Yanguang Zhou, University of California, Los Angeles, Los Angeles, CA, United States, Shiyun Xiong, Soochow University, China, Soochow, China, Xiaoliang Zhang, Dalian University of Technology, China, Dalian, China, Sebastian Volz, The University of Tokyo, Japan, Chatenay, France, Ming Hu, University of South Carolina, Columbia, DC, United States*

**11:24am** **Contact Line and Microlayer Movement in a Vapor Bubble during Pool Boiling**  
Technical Presentation. IMECE2018-88966  
*An Zou, Shalabh Maroo, Syracuse University, Syracuse, NY, United States*

## **10-36 K13-1 HEAT TRANSFER IN MULTIPHASE SYSTEMS**

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**10-36-3 K13-1 Heat Transfer in Multiphase Systems - III**

**Room 330 10:00am - 11:45am**

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Session Chair: **Vinod Srinivasan**, UMN, Minneapolis, MN, United States

**10:00am** **Transient Ash Deposition Modeling in Full-scale Low Temperature Heat Exchangers for Pulverized Coal-fired Power Plant Applications**  
Technical Presentation. IMECE2018-89694  
*Sandeep Aryal, Kwangkook Jeong, Arkansas State University, State University, AR, United States, Shinku Lee, Doosan Heavy Industries & Construction Co., LTD, Gyeongnam, Korea (Republic), Eungchul Lee, Doosan Heavy Industries & Construction Co. Ltd., Gyeongnam, Korea (Republic)*

**10:21am** **Analytical Modeling On Multiphase Heat And Mass Transfer In Full-Scale Gas-to-Gas Cooler For Pulverized Coal-Fired Power Plant Applications**  
Technical Presentation. IMECE2018-89698  
*Santosh Tamang, Arkansas State University, Jonesboro, AR, United States, Kwangkook Jeong, Arkansas State University, State University, AR, United States, Shinku Lee, Doosan Heavy Industries & Construction Co., LTD, Gyeongnam, Korea (Republic), Eungchul Lee, Doosan Heavy Industries & Construction Co. Ltd., Gyeongnam, Korea (Republic)*

**10:42am** **Thermal performance of Slurry Flow with Microencapsulated Phase Change Material in Circular Tube**  
Technical Presentation. IMECE2018-89940  
*Weiwei Zhu, Hamidreza Shabgard, University of Oklahoma, Norman, OK, United States*

**11:03am** **Substrate thermal conductivity controls the ability to manufacture microstructures via laser-induced direct write**  
Technical Presentation. IMECE2018-89797  
*John A. Tomko, David Olson, Jeffrey Braun, Andrew Kelliher, University of Virginia, Charlottesville, VA, United States, Bryan Kaehr, Sandia National Laboratories, Albuquerque, NM, United States, Patrick E. Hopkins, University of Virginia, Charlottesville, VA, United States*

**11:24am** **Integrated Wick System in Evaporatively-Cooled Heat Sink for Thermal Management of Thermoelectric Generators**  
Technical Paper Publication. IMECE2018-86904  
*Michael Ozeh, Purdue University Northwest, Hammond, IN, United States, A. G. Agwu Nnanna, University of Texas of the Permian Basin, Odessa, TX, United States*

**10-44 K18-1 THERMAL TRANSPORT UNDER HIGH TEMPERATURE AND/OR PRESSURE CONDITIONS**

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**10-44-1 Thermal transport under microscale and rotating features**

**Third Floor, David L. Lawrence Convention Center, Room 333 10:00am - 11:45am**

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Session Chair: **Qiuwang Wang**, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

**10:00am Experimental Investigation on Flow Field in a Rotating Channel With a New TR-PIV System**

Technical Paper Publication. IMECE2018-86976  
**SHENGJUN ZHOU, Haiwang Li, ZHI TAO, Ruquan You, Haoyu Duan**, *Beihang University, Beijing, China*

**10:21am Computational Investigation of the Effects of Pseudo-Boiling on Microscale Supercritical CO<sub>2</sub> Heat Transfer**

Technical Presentation. IMECE2018-87140  
**Mahdi Nabil, Alexander Rattner**, *The Pennsylvania State University, University Park, PA, United States*

**10:42am Experimental Investigation on Boundary Layer Flow Under the Effect of Temperature Gradient in a Smooth Rotating Channel Using Hot-Wire**

Technical Paper Publication. IMECE2018-87183  
**Gangfu Li, ZHI TAO, Huiji Wang, Ruquan You, Haiwang Li**, *Beihang University, Beijing, China*

**11:03am Numerical Study on Influencing Factors of Film Cooling on Turbine Blade Leading Edge Under Rotating State**

Technical Paper Publication. IMECE2018-87258  
**Yiwen Ma, Haiwang Li, Meisong Yang, Min Wu, Huimin Zhou**, *Beihang University, Beijing, Beijing, China*

**11:24am Rotating Film Cooling Performance of the Hole Near the Leading Edge on the Suction Side of the Turbine Blade**

Technical Paper Publication. IMECE2018-86929  
**Zhiyu Zhou, Haiwang Li, Haichao Wang, Guoqin Zhao, Feng Han, Min Wu**, *Beihang University, Beijing, Beijing, China*

**10-17 K8-3 FUNDAMENTALS OF MULTI-SCALE MODELING**

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**10-17-1 Fundamentals of Multi-Scale Modeling**

**Room 331 1:45pm - 3:30pm**

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Session Chair: **Nicholas Roberts**, *Utah State University, Logan, UT, United States*

Session Co-Chair: **Alan McGaughey**, *Carnegie Mellon Univ, Pittsburgh, PA, United States*

**1:45pm Long-wave Homogenization of Porous Media Electromagnetic Heat Exchangers**

Technical Presentation. IMECE2018-87408  
**Joseph Gaone, Burt Tilley, Vadim Yakovlev**, *Worcester Polytechnic Institute, Worcester, MA, United States*

**2:06pm From Discrete Ordinate Method to Interpolation Supplemented Lattice Boltzmann Modeling of In-Plane Phonon Transport**

Technical Paper Publication. IMECE2018-87590  
**Dongyang Zhao, Yangyu Guo**, *Tsinghua University, Beijing, Beijing, China*

**2:27pm Stochastic homogenization of randomly perturbed, multiscale periodic heat conduction problems**

Technical Presentation. IMECE2018-89762  
**Kelechi Ogbuanu**, *University of Delaware, Newark, DE, United States*, **R. Valery Roy**, *Univ Of Delaware, Newark, DE, United States*

**2:48pm Multiscale Investigation of Thickness Dependent Melting Thresholds of Nickel Film Under Femtosecond Laser Heating**

Technical Paper Publication. IMECE2018-86947  
**Pengfei Ji, Mengzhe He, Yiming Rong**, *Southern University of Science and Technology, Shenzhen, Guangdong, China*, **Yuwen Zhang**, *University Of Missouri, Columbia, MO, United States*, **Yong Tang**, *South China University of Technology, Guangzhou, Guangdong, China*

**3:09pm A Combined GCMC and FVM Simulation Method for CO<sub>2</sub> Adsorption in 13X Zeolite Adsorption Bed**

Technical Paper Publication. IMECE2018-87009  
**Hui Wang, Lu-Qiang Bai**, *College of Aeronautics, Northwestern Polytechnical University, Xi'an, China*, **Zhiguo Qu**, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, **Yu Wang**, *College of Aeronautics, Northwestern Polytechnical University, Xi'an, China*, **Yang Zhang**, *College of Aeronautics and Spaceflight, Xi'an Jiaotong University, Xi'an, China*

**10-21 K9-1 THERMAL TRANSPORT ACROSS HARD/ SOFT INTERFACES**

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**10-21-3 K9-1 Thermal transport across hard/soft interfaces - III**

**Room 330 1:45pm - 3:30pm**

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Session Chair: **Yee Kan Koh**, *National University of Singapore, Singapore, Singapore*

Session Co-Chair: **Anil Yuksel**, *IBM Corporation, Austin, TX, United States*

**1:45pm Fundamental Study of Multiple Slopes Exhibited by Measured Thermal Contact Conductance (TCC) Versus Load Data for Metal-Metal Contacts**

Technical Paper Publication. IMECE2018-86722  
**Navni N Verma**, *Ohio State University, Columbus, OH, United States*, **Sandip Mazumder**, *Ohio State Univ, Columbus, OH, United States*

**2:06pm Transient Heat and Mass Transfer During Gas Adsorption Into Metal-Organic Frameworks**

**Technical Presentation.** IMECE2018-88057

*Hasan Babaei, University of Pittsburgh, Carnegie Mellon University, Pittsburgh, PA, United States, Christopher E. Wilmer, University of Pittsburgh, Pittsburgh, PA, United States*

**2:27pm Heat Transfer Modeling of Nanoparticle Packings on a Substrate**

**Technical Paper Publication.** IMECE2018-88642

*Anil Yuksel, IBM Corporation, Austin, TX, United States, Edward Yu, Michael Cullinan, University of Texas at Austin, Austin, TX, United States, Jayathi Murthy, University of California, Los Angeles, Los Angeles, CA, United States*

**2:48pm Monitoring heat transport across organic-inorganic heterojunctions with atomic spatial resolution**

**Technical Presentation.** IMECE2018-89393

*Yuexiang Yan, Yee Kan Koh, National University of Singapore, Singapore, Singapore*

**10-26 K9-6 NANOSCALE RADIATION HEAT TRANSFER**

**10-26-1 Measurement of Near-field Thermal Radiation**

**Room 329 1:45pm - 3:30pm**

Session Chair: **Liping Wang**, Arizona State University, Tempe, AZ, United States

Session Co-Chair: **Bo Zhao**, Stanford University, Stanford, CA, United States

**1:45pm Near-Field based Energy Transfer and Conversion in Nanoscale Gaps**

**Invited Presentation.** IMECE2018-89363

*Pramod Sangi Reddy, University of Michigan, Ann Arbor, MI, United States*

**2:27pm Experimental Measurement of the Spectrum of Near-Field Thermal Emission**

**Technical Presentation.** IMECE2018-88834

*Saman Zare, Carl Tripp, Sheila Edalatpour, University of Maine, Orono, ME, United States*

**2:48pm Conversion of Heat to Electricity Using a Nano Gap Near-field Thermophotovoltaic Device**

**Technical Presentation.** IMECE2018-89352

*Linxiao Zhu, Anthony Fiorino, Dakota Thompson, Rohith Mittapally, Pramod Sangi Reddy, Edgar Meyhofer, University of Michigan, Ann Arbor, MI, United States*

**3:09pm Near-field Radiative Thermal Regulation with Electrically Tunable Monolayer Graphene**

**Technical Presentation.** IMECE2018-89213

*Xiaoyan Ying, Liping Wang, Arizona State University, Tempe, AZ, United States*

**10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS**

**10-29-7 Micro-/Nanoelectronics and Related Issues**

**Third Floor, David L. Lawrence Convention Center, Room 333 1:45pm - 3:30pm**

Session Chair: **Sanjiv Sinha**, University of Illinois, Urbana, IL, United States

Session Co-Chair: **Yanbao Ma**, Univ. California, Merced, Merced, CA, United States

**1:45pm Phonon Transport Properties of Pristine and Defective beta-Ga<sub>2</sub>O<sub>3</sub>**

**Invited Presentation.** IMECE2018-89447

*Zhequan Yan, Georgia Tech, Atlanta, GA, United States, Satish Kumar, Georgia Institute of Technology, Atlanta, GA, United States*

**2:27pm 3D Anisotropic Thermal Conductivity Tensor of beta-Ga<sub>2</sub>O<sub>3</sub> Measured Using an Elliptical-beam TDTR Approach**

**Technical Presentation.** IMECE2018-87569

*Puqing Jiang, Xin Qian, University of Colorado Boulder, Boulder, CO, United States, Ronggui Yang, University of Colorado, Boulder, CO, United States*

**2:48pm Multi-length Scale Electrothermal Simulations of GaN-Based Field Effect Transistors**

**Technical Presentation.** IMECE2018-88133

*Qing Han, Hongbin Zhao, Bo Zhao, University of Arizona, Tucson, AZ, United States*

**3:09pm Ultra-Compliant Heterogeneous Copper-Tin Nanowire Arrays Making A Super-Solder**

**Technical Presentation.** IMECE2018-89168

*Wei Gong, Pengfei Li, Yunheng Zhang, Carnegie Mellon University, Pittsburgh, PA, United States, Xuhui Feng, National Renewable Energy Laboratory, Golden, CO, United States, Joshua Major, National Renewable Energy Lab, Golden, CO, United States, Douglas DeVoto, NREL, Golden, CO, United States, Paul Paret, National Renewable Energy Laboratory, Golden, CO, United States, Charles King, Sreekanth Narumanchi, National Renewable Energy Lab, Golden, CO, United States, Sheng Shen, Carnegie Mellon University, Pittsburgh, PA, United States*

**10-11 K6-10 PANEL ON THE KEY ROLE OF HEAT TRANSFER ANALYSIS IN ENERGY SYSTEMS RESEARCH**

**10-11-1 K6-10 Panel on the key role of heat transfer analysis and methodology in research**

**Room 330 3:45pm - 5:30pm**

Session Chair: **Nesrin Ozalp**, University of Minnesota Duluth, Duluth, MN, United States

**3:45pm** The key role of heat transfer analysis in energy systems research

Panel Presentation. IMECE2018-89073

*Patrick Oosthuizen, Queen's University, Kingston, QC, Canada*

**4:06pm** Panel on the key role of heat transfer analysis in energy systems research

Panel Presentation. IMECE2018-90046

*Debjyoti Banerjee, Texas A&M University, College Station, TX, United States*

**4:27pm** Panel on the key role of heat transfer analysis in energy systems research

Panel Presentation. IMECE2018-90047

*Yaroslav Chudnovsky, Gas Technology Institute, Des Plaines, IL, United States*

**4:48pm** Panel on the key role of heat transfer analysis in energy systems research

Panel Presentation. IMECE2018-90048

*Kashif Nawaz, Oak Ridge National Laboratory | ORNL, Oak Ridge, TN, United States*

## **10-18 K8-4 FUNDAMENTALS OF LIQUID/SOLID PHASE CHANGE (ICING/DEICING, SOLIDIFICATION)**

**10-18-1 K8-4 Fundamentals of Liquid/Solid Phase Change (icing/deicing, solidification)**

**Room 331 3:45pm - 5:30pm**

Session Chair: **Enakshi Wikramanayake**, *The University of Texas At Austin, Austin, TX, United States*

Session Co-Chair: **Shalabh Maroo**, *Syracuse University, Syracuse, NY, United States*

**3:45pm** Extreme Icephobicity of Passive Anti-Icing Materials

Technical Presentation. IMECE2018-86360

*Rukmava Chatterjee, University of Illinois at Chicago, Chicago, IL, United States, Daniel Beysens, ESPCI PMMH, École Supérieure de Physique et de Chimie Industrielles, Paris, France, Sushant Anand, University of Illinois at Chicago, Chicago, IL, United States*

**4:06pm** Exploration of Variable Conductance Effects During Input and Extraction of Heat From Phase Change Thermal Storage

Technical Paper Publication. IMECE2018-88078

*Zachary Theroff, University of California, Berkeley, CA, United States, Dre Helms, University of California, Berkeley, Berkeley, CA, United States, Van P. Carey, University Of California, Berkeley, CA, United States*

**4:27pm** Pore-Scale Modeling on Solidification of Paraffin with Volume Change in High Porosity Open-Cell Metal Foam

Technical Presentation. IMECE2018-88875

*Yuanpeng Yao, Huiying Wu, Shanghai Jiao Tong University, Shanghai, China*

**4:48pm** Molecular Dynamics Simulations of Droplet Condensation on Nano-Structured Surfaces

Technical Presentation. IMECE2018-88981

*Shalabh Maroo, Manish Gupta, Syracuse University, Syracuse, NY, United States, M. Fernandez, C.A. Dorao, Norwegian University of Science and Technology, Trondheim, Norway*

## **10-26 K9-6 NANOSCALE RADIATION HEAT TRANSFER**

**10-26-2 Theoretical Prediction of Thermal Emission and Energy Conversion**

**Room 329 3:45pm - 5:30pm**

Session Chair: **Sheng Shen**, *Carnegie Mellon University, Pittsburgh, PA, United States*

Session Co-Chair: **Sheila Edalatpour**, *University of Maine, Orono, ME, United States*

**3:45pm** Near-Field Thermal Emission by Periodic Arrays

Technical Presentation. IMECE2018-86335

*Sheila Edalatpour, University of Maine, Orono, ME, United States*

**4:06pm** Dipolar Radiative Thermal Conductivity in Nanoparticle Arrays

Technical Presentation. IMECE2018-89069

*Eric Tervo, Georgia Tech, Atlanta, GA, United States, Barantunde Cola, Zhuomin Zhang, Georgia Institute of Technology, Atlanta, GA, United States*

**4:27pm** Near-field Thermophotonic Systems for Low-Grade Waste Heat Recovery

Technical Presentation. IMECE2018-86723

*Bo Zhao, Parthiban Santhanam, Kaifeng Chen, Siddharth Buddhiraju, Shanhui Fan, Stanford University, Stanford, CA, United States*

**4:48pm** Quasi-Normal Mode Theory for Resonant Thermal Infrared Emitters in Near- and Far-Fields

Technical Presentation. IMECE2018-89227

*Jiayu Li, Sheng Shen, Liu Baoan, Carnegie Mellon University, Pittsburgh, PA, United States*

**5:09pm** Directional and narrow-band thermal emission from nanoantennas

Technical Presentation. IMECE2018-89391

*Bowen Yu, Jiayu Li, Sheng Shen, Carnegie Mellon University, Pittsburgh, PA, United States*

**10-44 K18-1 THERMAL TRANSPORT UNDER HIGH TEMPERATURE AND/OR PRESSURE CONDITIONS**

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**10-44-2 Thermal transport understanding and its applications**

**Third Floor, David L. Lawrence Convention Center, Room 333 3:45pm - 5:30pm**

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Session Chair: **Qiuwang Wang**, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

**3:45pm Incubation Phenomenon Induced by Multiple Femtosecond Laser Pulses Burst From a Single Pulse to Process Aluminum**

**Technical Paper Publication.** IMECE2018-86960

**Pengfei Ji, Mengzhe He, Yiming Rong**, *Southern University of Science and Technology, Shenzhen, Guangdong, China*, **Yuwen Zhang**, *University Of Missouri, Columbia, MO, United States*, **Yong Tang**, *South China University of Technology, Guangzhou, Guangdong, China*

**4:06pm Lattice thermal transport in superhard hexagonal diamond and wurtzite boron nitride under high temperature and/or high pressure**

**Technical Presentation.** IMECE2018-89714

**Pranay Chakraborty**, *University of Nevada, Reno (mechanical Department), Reno, NV, United States*, **Guoping Xiong, Lei Cao, Yan Wang**, *University of Nevada, Reno, Reno, NV, United States*

**4:27pm Numerical simulation with LB Method for Propane Combustion Within Catalytic Micro-Porous Media Combustor**

**Technical Paper Publication.** IMECE2018-86754

**X.B Feng**, *Xi'an Jiaotong University, Xi'an, China*, **Zhiguo Qu**, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*

**4:48pm Fruit Ripeness Estimation for Avocado Using Thermal Imaging**

**Technical Paper Publication.** IMECE2018-86290

**Sathish Kumar Gurupatham, Nick Jacob**, *kennesaw state university(formerly southern polytechnic state univ, Marietta, GA, United States*, **Kevin Van Der Horn**, *Kennesaw State University, Marietta, GA, United States*, **Fahad Fahad**, *kennesaw state university(formerly southern polytechnic state univ, marietta, GA, United States*, **Erhan Ilksoy**, *Kennesaw State Univeristy, Marietta, GA, United States*

**5:09pm Tunable thermal transport and reversible thermal conductivity switching in topologically networked bio-inspired materials**

**Technical Presentation.** IMECE2018-89793

**John A. Tomko**, *University of Virginia, Charlottesville, VA, United States*, **Abdon Pena-Francesch, Huihun Jung**, *Pennsylvania State University, State College, PA, United States*, **Madhusudan Tyagi**, *National Institute of Standards, Gaithersburg, MD, United States*, **Benjamin Allen**, *Pennsylvania State University, State College, PA, United States*, **Melik Demirel**, *Penn State Univ, University Park, PA, United States*, **Patrick E. Hopkins**, *University of Virginia, Charlottesville, VA, United States*

**THURSDAY, NOVEMBER, 15**

**10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS**

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**10-29-5 Thermal Engineering with Plasmonic Materials**

**Fourth Floor, David L. Lawrence Convention Center, Room 405 8:00am - 8:45am**

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Session Chair: **Sanjiv Sinha**, *University of Illinois, Urbana, IL, United States*

Session Co-Chair: **Edward Kinzel**, *Missouri University of Science and Technology, Rolla, MO, United States*, **Yu-bin Chen**, *National Tsing Hua University, Hsinchu, Taiwan*

**8:00am Ultrathin liquid film thickness measurement using surface plasmon resonance imaging**

**Technical Presentation.** IMECE2018-89269

**Itai (isaac) Kim**, *Texas A&M University-Corpus Christi, CORPUS CHRISTI, TX, United States*

**8:21am Surface Plasmon Effects on the Interfacial Heat Transport Processes in Gold Nanorods**

**Technical Presentation.** IMECE2018-89712

**Andrew Kelliher, John A. Tomko**, *University of Virginia, Charlottesville, VA, United States*, **Brian B. Lynch, Joseph B. Tracy**, *North Carolina State University, Raleigh, NC, United States*, **Patrick Hopkins**, *University of Virginia, Charlottesville, VA, United States*

**8:42am OPTIMIZATION OF EXTERNAL QUANTUM EFFICIENCY OF THIN FILM SOLAR CELLS USING SURROGATE MODELING OF ABSORPTIVITY**

**Technical Presentation.** IMECE2018-89012

**Mine Kaya**, *Texas A&M Univeristy, College Station, TX, United States*, **Shima Hajimirza**, *Texas A&M University, College Station, TX, United States*

**10-13 K7-1 MEASUREMENTS OF THERMOPHYSICAL PROPERTIES**

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**10-13-1 Measurements of Thermophysical Properties**

**Third Floor, David L. Lawrence Convention Center, Room 326 8:55am - 10:40am**

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Session Chair: **Nicholas Roberts**, *Utah State University, Logan, UT, United States*

**8:55am Picosecond transient thermoreflectance technique for measuring thermal conductivity in thin-films**

**Technical Presentation.** IMECE2018-87712

**Jihoon Jeong, Xianghai Meng, Jung-Fu Lin**, *The University of Texas At Austin, Austin, TX, United States*, **Yaguo Wang**, *University of Texas At Austin, Austin, TX, United States*

**9:16am The Thermal Properties of Pristine and Loaded Metal Organic Framework Thin Films Under Different Environmental Conditions**

**Technical Presentation.** IMECE2018-89240

**Mallory E. DeCoster**, University of Virginia, Charlottesville, VA, United States, **Hasan Babaei**, University of Pittsburgh, Carnegie Mellon University, Pittsburgh, PA, United States, **Minyoung Jeong**, Carnegie Mellon University, Pittsburgh, PA, United States, **Zeinab Hassan**, Karlsruhe Institute of Technology, Baden-Wurtemberg, Baden-Wurtemberg, Germany, **Timur Islamoglu**, Northwestern University, Evanston, IL, United States, **Christopher E. Wilmer**, University of Pittsburgh, Pittsburgh, PA, United States, **Helmut Baumgart**, Old Dominion University, Newport News, VA, United States, **Jonathan Malen**, Carnegie Mellon University, Pittsburgh, PA, United States, **Engelbert Redel**, Karlsruhe Institute of Technology, Baden-Wurtemberg, Baden-Wurtemberg, Germany, **Patrick Hopkins**, University of Virginia, Charlottesville, VA, United States

**9:37am Thermal Transport in Electrospun Vinyl Polymer Nanofibers: Effects of Molecular Weight and Side Chain Groups**

**Technical Presentation.** IMECE2018-89769

**Yin Zhang**, Southeast University, Nanjing, China, **Xin Zhang**, **Lin Yang**, **Qian Zhang**, **Matthew Fitzgerald**, Vanderbilt University, Nashville, TN, United States, **Akira Ueda**, Fisk University, Nashville, TN, United States, **Yunfei Chen**, Southeast University, Nanjing, OO, China, **Richard Mu**, Tennessee State University, Nashville, TN, United States, **Deyu Li**, Vanderbilt Univ, Nashville, TN, United States, **Leon Bellan**, Vanderbilt University, Nashville, TN, United States

**9:58am Microstructural and Thermal Characterization of Diamond Nanofluids**

**Technical Paper Publication.** IMECE2018-89796

**Farzin Mashali**, Tennessee Tech University, Cookeville, TN, United States, **Ethan Languri**, Tennessee Technological University, Cookeville, TN, United States, **Gholamreza Mirshekari**, Tennessee Tech University, Cookeville, TN, United States, **Jim Davidson**, **David Kerns**, FemtoScience, Nashville, TN, United States

**10:19am Evaluation of Heat Transfer Kinetics on Layers of Air-Rich Soft Materials in Their Natural State**

**Technical Paper Publication.** IMECE2018-87268

**Hiroki Kaneko**, Graduate School, Kyoto Institute of Technology, Kyoto, Japan, **Atsushi Sakuma**, Kyoto Institute of Technology, Kyoto, Japan

**10-26 K9-6 NANOSCALE RADIATION HEAT TRANSFER**

**10-26-3 Radiative Properties and Radiative Transfer in the Far Field**

**Third Floor, David L. Lawrence Convention Center, Room 324 8:55am - 10:40am**

Session Chair: **Liping Wang**, Arizona State University, Tempe, AZ, United States

Session Co-Chair: **Zhen Chen**, Southeast University, Nanjing, Jiangsu, China

**8:55am Simultaneously and synergistically harvest energy from the sun and outer space**

**Technical Presentation.** IMECE2018-86538

**Zhen Chen**, Southeast University, Nanjing, Jiangsu, China, **Linxiao Zhu**, University of Michigan, Ann Arbor, MI, United States, **Wei Li**, **Shanhui Fan**, Stanford University, Stanford, CA, United States

**9:16am Scalable Metal-Free Paint for Passive Radiative Cooling under Direct Sunlight in Daytime and Nighttime**

**Technical Paper Publication.** IMECE2018-88658

**Xiangyu Li**, Purdue University, West Lafayette, IN, United States, **Zhifeng Huang**, Wuhan University, Wuhan, China, **Joseph Peoples**, Purdue University, West Lafayette, IN, United States, **Jun Qiu**, Harbin Institute of Technology, Harbin, China, **Xiulin Ruan**, Purdue Univ, West Lafayette, IN, United States

**9:37am Hierarchical Approach of Nanoparticle Size Selection for Enhancing Reflectance of the Solar Irradiation**

**Technical Presentation.** IMECE2018-89973

**Joseph Peoples**, **Xiangyu Li**, Purdue University, West Lafayette, IN, United States, **Yaobing Lv**, School of Energy Science and Engineering, Harbin Institute of Technology, Harbin, China, **Jun Qiu**, Harbin Institute of Technology, Harbin, China, **Zhifeng Huang**, Wuhan University, Wuhan, China, **Xiulin Ruan**, Purdue Univ, West Lafayette, IN, United States

**9:58am Thermochromic VO<sub>2</sub>-Based Variable Emissivity Coatings for Spacecraft Thermal Control**

**Technical Presentation.** IMECE2018-89215

**Sydney Taylor**, **Liping Wang**, Arizona State University, Tempe, AZ, United States

**10:19am Multi-Fold Enhancement in Far-Field Radiative Heat Transfer Over the Blackbody Limit**

**Technical Presentation.** IMECE2018-89312

**Dakotah Thompson**, **Linxiao Zhu**, **Rohith Mittapally**, **Seid Sadat**, University of Michigan, Ann Arbor, MI, United States, **Zhen Xing**, **Patrick McArdle**, **Mumtaz Qazilbash**, College of William and Mary, Williamsburg, VA, United States, **Pramod Sangi Reddy**, **Edgar Meyhofer**, University of Michigan, Ann Arbor, MI, United States

**10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS**

**10-29-2 Heat Transfer Devices and Engineering**

**Third Floor, David L. Lawrence Convention Center, Room 325 8:55am - 10:40am**

Session Chair: **Sanjiv Sinha**, University of Illinois, Urbana, IL, United States

Session Co-Chair: **Neil Zuckerman**, Seagate Technologies, Bloomington, MN, United States

**8:55am Flow Characteristics of Nitrogen (N<sub>2</sub>) in Micro-Channels of Printed Circuit Heat Exchanger (PCHE)**

**Technical Paper Publication.** IMECE2018-86617

**Jeong-Heon Shin**, Korea Institute of Machinery and Materials, Daejeon, Daejeon, Korea (Republic), **Seok Ho Yoon**, KIMM, Daejeon, Korea (Republic), **Jun Seok Choi**, Korea Institute of Machinery & Materials, Daejeon, Korea (Republic)

**9:16am** Enhanced heat convection in nanochannels through surface engineering

Technical Presentation. IMECE2018-89827

*Pranay Chakraborty, University of Nevada, Reno (mechanical Department), Reno, NV, United States, Tengfei Ma, Yan Wang, University of Nevada, Reno, Reno, NV, United States*

**9:37am** Simulation and Fabrication of Additively Manufactured Heat Pipes

Technical Presentation. IMECE2018-89839

*Daniel Hsieh, UIUC, Urbana, TX, United States, Oluseyi Babatola, Sanjiv Sinha, University of Illinois, Urbana, IL, United States*

**9:58am** Optimization of Heat Transfer using Nano-Cutting Fluids

Technical Presentation. IMECE2018-89618

*Ali Hussain Kazim, Marriyam Shabbir, Faiza Mansoor, Sumaira Gulfam, University of Engineering and Technology, Lahore, Lahore, Punjab, Pakistan*

**10:19am** Thermomechanical design optimization of roll-to-roll manufactured hybrid metal-polymer heat exchanger pipes for waste heat recovery

Technical Presentation. IMECE2018-89791

*Manjunath Rajagopal, University of Illinois, Urbana, IL, United States, Yuquan Meng, Timothy Man, Harikrishnan Kumar, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Arpit Dwivedi, University of Illinois, Urbana, IL, United States, Dhruv Gelda, University of Illinois, Urbana, IL, United States, Chenhui Shao, University of Illinois At Urbana-Champaign, Urbana, IL, United States, Sanjiv Sinha, University of Illinois, Urbana, IL, United States*

**10-47 K18-4 THERMAL ANALYSIS OF INDUSTRIAL EQUIPMENT AND SYSTEMS OPERATING UNDER EXTREME PROCESS CONDITIONS**

**10-47-1 Heat transfer and heat exchange**

**Third Floor, David L. Lawrence Convention Center, Room 327 8:55am - 10:40am**

Session Chair: *Qiuwang Wang, Xi'an Jiaotong University, Xi'an, Shaanxi, China*

**8:55am** Performance Analysis of Multi-Pass Cross-Flow Heat Exchangers

Technical Paper Publication. IMECE2018-87049

*Kiran Lankalapalli, Tennessee Tech University, Cookeville, TN, United States, Ahmed ElSawy, Tennessee Technological University, Cookeville, TN, United States, Stephen Idem, Tennessee Tech Univ, Cookeville, TN, United States*

**9:16am** The Cooling Process of Agricultural Products After Boxing and Palletizing

Technical Paper Publication. IMECE2018-87788

*Aklilu Giorges, Georgia Tech Research Institute, Atlanta, GA, United States, John Pierson, Georgia Tech, Atlanta, GA, United States*

**9:37am** Turbulent Multi-Jet Air Impingement for Applications in Commercial Cooking

Technical Paper Publication. IMECE2018-88635

*Shantanu Shevade, University of South Florida, Tampa, FL, United States, Muhammad Rahman, Wichita State University, Wichita, KS, United States, Rasim Guldiken, University of South Florida, Tampa, FL, United States*

**9:58am** Heat Transfer Aspect of a Counter-Current Two Phase Flow System for Harvesting Natural Gas from Sea-floor Hydrates

Technical Presentation. IMECE2018-88853

*Boyun Guo, Univ Of Louisiana, Lafayette, LA, United States*

**10:19am** Experimental comparison of 50 kW and 200 kW Printed Circuit Heat Exchangers (PCHE)

Technical Presentation. IMECE2018-89521

*Jeong-Heon Shin, Korea Institute of Machinery and Materials, Daejeon, Daejeon, Korea (Republic), Joo Ha Ahn, TankTech, Busan, Korea (Republic), Jungchul Kim, Sangho Sohn, Korea Institute of Machinery and Materials, Daejeon, Korea (Republic), Seok Ho Yoon, KIMM, Daejeon, Korea (Republic)*

**10-55 K20-5 PANEL: ?HEAT TRANSFER AND FLUID FLOW ROUNDTABLE: NAVIGATING THE CODE LANDSCAPE?**

**10-55-1 Heat Transfer and Fluid Flow Roundtable: Navigating the Code Landscape**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 8:55am - 10:40am**

Session Chair: *Leitao Chen, Rice University, Houston, TX, United States*

**8:55am** Computational Heat and Mass Transfer in Extreme Conditions

Panel Presentation. IMECE2018-90064

*Leitao Chen, Rice University, Houston, TX, United States*

**9:37am** Industrial Multiphase CFD

Panel Presentation. IMECE2018-90065

*Leitao Chen, Rice University, Houston, TX, United States*

**10-63 K10-4 MULTI-PHASE AND PASSIVE ENHANCED HEAT TRANSFER**

**10-63-2 Multi-Phase and Passive Enhanced Heat Transfer**

**Room 328 8:55am - 10:40am**

Session Chair: *Amanie Abdelmessih, California Baptist University, Diamond Bar, CA, United States*

Session Co-Chair: *Ahmed Elatar, Oak Ridge National Laboratory, Oak Ridge, TN, United States*

**Draft Program**

**8:55am**            **Enhanced Heat Transfer in Radial Heat Sinks for LED Lamps**

**Technical Paper Publication.** IMECE2018-87958

**Fernando Cano-Banda**, University of Guanajuato, Irapuato Guanajuato, Guanajuato, Mexico, **Ana Gallardo-Gutierrez**, University of Guanajuato, Salamanca, Guanajuato, Mexico, **Luis Lu-viano-Ortiz**, University of Guanajuato, Salamanca/Guanajuato, Guanajuato, Mexico, **Abel Hernandez-Guerrero**, University of Guanajuato, Salamanca, Guanajuato, Guanajuato, Mexico, **Je-sus Garcia-Gonzalez**, Grupo SSC, San Miguel de Allende, Gua-najuato, Mexico

**9:16am**            **Influence of Pattern Geometry of Hybrid Sur-faces on Dropwise Condensation Heat Transfer and Droplet Dynamics**

**Technical Paper Publication.** IMECE2018-88571

**karim egab**, University of Mazaya, Nassiriyah, Nassiriyah, Iraq, **Saad Oudah**, **Mohammad Alwazzan**, University of south caro-lina, Columbia, SC, United States, **Jamil Khan**, Univ Of South Carolina, Columbia, SC, United States, **Chen Li**, U. of South Car-olina, Columbia, SC, United States

**9:37am**            **Effects of surface microstructure parameters on spray cooling efficiency**

**Technical Presentation.** IMECE2018-89510

**Sankarganesh Muthukrishnan**, University of Minnesota Twin Cities, Minneapolis, MN, United States, **Vinod Srinivasan**, UMN, Minneapolis, MN, United States

**9:58am**            **Direct numerical simulation of evaporating meniscus in capillary channel**

**Technical Presentation.** IMECE2018-89931

**Mohammad Naghashnejad**, **Hanidza Sabarudin**, Universiti of Oklahoma, Norman, OK, United States

## **10-14 K7-2 COMPUTATIONS OF THERMOPHYSICAL PROPERTIES**

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### **10-14-1 Calculations of Thermophysical Properties 1**

**Third Floor, David L. Lawrence Convention Center, Room 326    10:50am - 12:35pm**

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Session Chair: **Nicholas Roberts**, Utah State University, Logan, UT, United States

**10:50am**            **The Effects of Neutron Irradiation Damage on the Lattice Thermal Conductivity of Beta-Silicon Carbide**

**Technical Presentation.** IMECE2018-87896

**William Yorgason**, Utah State, Logan, UT, United States, **Arden Barnes**, **Nicholas Roberts**, Utah State University, Logan, UT, United States

**11:11am**            **Effective electronics cooling through microchannel heat sink (MCHS) applications**

**Technical Presentation.** IMECE2018-88802

**Sonya Smith**, **Darryl Jennings, Jr.**, Howard University, Wash-ington, DC, United States

**11:32am**            **A Reliable Approach to Calculation of Thermophysical Properties of Liquid Using Molecular Dy-namics Simulations**

**Technical Presentation.** IMECE2018-88837

**Seyed Aliakbar Mirmohammadi**, University of Sydney, Sydney, New South Wales, Australia

**11:53am**            **Tunable Thermal Conductivity of Two-Dimensional Polymers**

**Technical Presentation.** IMECE2018-89117

**Hao Ma**, **Erica O'Donnel**, **Zhiting Tian**, Virginia Tech, Blacks-burg, VA, United States

**12:14pm**            **Evaluating the accuracy of neural network potential for thermal transport properties of silicon**

**Technical Presentation.** IMECE2018-89487

**Hasan Babaei**, University of Pittsburgh, Carnegie Mellon Univer-sity, Pittsburgh, PA, United States, **Sangyeop Lee**, University of Pittsburgh, Pittsburgh, PA, United States

## **10-27 K9-7 ADVANCES IN METROLOGY**

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### **10-27-1 Thermal Metrology for Nanoscale Heat Transfer**

**Third Floor, David L. Lawrence Convention Center, Room 324    10:50am - 12:35pm**

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Session Chair: **Yongjie Hu**, University of California, Los Angeles (UCLA), Los Angeles, CA, United States

Session Co-Chair: **Sanjiv Sinha**, University of Illinois, Urbana, IL, United States

**10:50am**            **Nanoscale thermal metrology using electrons and photons**

**Invited Presentation.** IMECE2018-89876

**Chris Dames**, UC Berkeley, Berkeley, CA, United States

**11:32am**            **A Multi-Frequency 3 Omega Method for Tracking Moving Phase Boundaries in Real Time**

**Technical Presentation.** IMECE2018-89632

**Wyatt Hodges**, **Chris Dames**, UC Berkeley, Berkeley, CA, Unit-ed States

**11:53am**            **Reflection of gigahertz acoustic phonons in silicon at a nanowire-bulk interface**

**Technical Presentation.** IMECE2018-89743

**Dhruv Gelda**, University of Illinois, Urbana, IL, United States, **Marc Ghossoub**, Intel, Hillsboro, OR, United States, **Manjunath Rajagopal**, **Sanjiv Sinha**, University of Illinois, Urbana, IL, Unit-ed States

**12:14pm**            **A New Experimental Metrology based on Asymmetric Time-Domain Thermorefectance Meth-od for Anisotropic Thermal Conductivity Measurement**

**Technical Presentation.** IMECE2018-86052

**Man Li**, **Joon Sang Kang**, **Yongjie Hu**, University of California, Los Angeles (UCLA), Los Angeles, CA, United States

## 10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS

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### 10-29-3 Transport at Interfaces

Third Floor, David L. Lawrence Convention Center,  
Room 323 10:50am - 12:35pm

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Session Chair: **Sanjiv Sinha**, *University of Illinois, Urbana, IL, United States*

Session Co-Chair: **Yan Wang**, *University of Nevada, Reno, Reno, NV, United States*

#### 10:50am Phonon-mediated Thermal Transport at Bridged Solid-Solid Interfaces

Technical Presentation. IMECE2018-88883

**Rouzbeh Rastgar**, *Jingjie Zhang*, *University of Virginia, Charlottesville, VA, United States*, **Carlos Polanco**, *ORNL, oak ridge, TN, United States*, **Nam Q. Le**, *NRL, Washington D.C., DC, United States*, **Avik W. Ghosh**, **Pamela M. Norris**, *University of Virginia, Charlottesville, VA, United States*

#### 11:11am The Impact of Interdiffusion of Metal Adhesion Layers on Thermal Interface Conductance

Technical Presentation. IMECE2018-86379

**Dipanjan Saha**, **Xiaoxiao Yu**, **Minyoung Jeong**, **Mohamed Darwish**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Jeffrey Weldon**, *University of Hawaii, Honolulu, HI, United States*, **Andrew Gellman**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Jonathan Malen**, *Carnegie Mellon University, Pittsburgh, PA, United States*

#### 11:32am Non-equilibrium and Non-Diffusive Phonon Transport Near Al/GaN Interface

Technical Presentation. IMECE2018-87185

**Xin Qian**, *University of Colorado Boulder, Boulder, CO, United States*, **Xiaokun Gu**, *Shanghai Jiao Tong University, Shanghai, China*, **Puqing Jiang**, *University of Colorado Boulder, Boulder, CO, United States*, **Ronggui Yang**, *University of Colorado, Boulder, CO, United States*

#### 11:53am The influence of titanium adhesion layer oxygen stoichiometry on thermal boundary conductance at gold contacts

Technical Presentation. IMECE2018-89135

**David Olson**, **Keren M. Freedy**, **Patrick Hopkins**, **Stephen J. McDonnell**, *University of Virginia, Charlottesville, VA, United States*

#### 12:14pm Spatial Mapping and Analysis of Thermal Boundary Conductance of Metal/MoSe<sub>2</sub> Interfaces Using Time-Domain Thermoreflectance

Technical Presentation. IMECE2018-89746

**David B. Brown**, *Georgia Institute of Technology, Atlanta, GA, United States*, **Xufan Li**, **Kai Xiao**, **David B. Geohegan**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **Satish Kumar**, *Georgia Institute of Technology, Atlanta, GA, United States*

### 10-29-4 Thermal Conductivity

Fourth Floor, David L. Lawrence Convention Center,  
Room 405 10:50am - 12:35pm

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Session Chair: **Sanjiv Sinha**, *University of Illinois, Urbana, IL, United States*

Session Co-Chair: **Yee Kan Koh**, *National University of Singapore, Singapore, Singapore*

#### 10:50am Effect of Loading the MOF HKUST-1 With Water, Methanol and Ethanol On Its Thermal Conductivity

Invited Presentation. IMECE2018-88286

**Hasan Babaei**, *University of Pittsburgh, Carnegie Mellon University, Pittsburgh, PA, United States*, **Minyoung Jeong**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Jonathan Malen**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Christopher E. Wilmer**, *University of Pittsburgh, Pittsburgh, PA, United States*

#### 11:32am Thermal Conductivity Of ALD Grown PbTe/PbSe Superlattice Thin Films

Technical Presentation. IMECE2018-89249

**Mallory E. DeCoster**, *University of Virginia, Charlottesville, VA, United States*, **Xin Chen**, **Kai Zhang**, **Helmut Baumgart**, *Old Dominion University, Newport News, VA, United States*, **Patrick Hopkins**, *University of Virginia, Charlottesville, VA, United States*

#### 11:53am TX-100 Capped Iron Oxide Nanoparticle Transformation and Implications for Induction Heating and Hyperthermia Treatment

Technical Presentation. IMECE2018-87556

**Hayden Carlton**, *University of Arkansas, Fayetteville, AR, AR, United States*, **David Huitink**, *University of Arkansas, Fayetteville, AR, United States*

#### 12:14pm Thermal Conductivity of Poly(3,4-ethylenedioxythiophene) Films Engineered by oxidative Chemical Vapor Deposition (OCVD)

Technical Presentation. IMECE2018-89324

**Phil M Smith**, **Laisuo Su**, **Wei Gong**, **Nathan Nakamura**, **B. Reeja-Jayan**, **Sheng Shen**, *Carnegie Mellon University, Pittsburgh, PA, United States*

## 10-30 K10-1 SINGLE-PHASE ENHANCED HEAT TRANSFER ? NUMERICAL STUDIES

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### 10-30-2 Single-Phase Enhanced Heat Transfer - Numerical Studies - I

Fourth Floor, David L. Lawrence Convention Center,  
Room 406 10:50am - 12:35pm

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Session Chair: **Maulik Shelat**, *Praxair, Williamsville, NY, United States*

Session Co-Chair: **Ahmed Elatar**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

#### 10:50am Heat Transfer Analyses of a 3D Graphene-Carbon Nanotube Pillared Structure

Technical Paper Publication. IMECE2018-87029

**Khaled Almahmoud**, **Weihuan Zhao**, *University of North Texas, Denton, TX, United States*

**11:11am Shape Optimization of Microchannels Using Surrogate Modelling**

Technical Paper Publication. IMECE2018-87780

*Muhammad Ansab Ali, Tariq Saeed Khan, The Petroleum Institute, Khalifa University of Science and Technology, Abu Dhabi, ABU DHABI, United Arab Emir., Saqib Salam, The Petroleum Institute, Abu Dhabi, Abu Dhabi, United Arab Emir., Ebrahim Al-Hajri, Petroleum Institute of Abu Dhabi, Abu Dhabi, United Arab Emir.*

**11:32am Effect of Inter-Connector on Thermo-Hydraulic Characteristics of Parallel and Counter Flow Mini-Channel Heat Sink**

Technical Paper Publication. IMECE2018-88273

*Amitav Tikadar, Saad Oudah, University of South Carolina, Columbia, SC, United States, Azzam Salman, University of South Carolina, West Columbia, SC, United States, A.K.M. Monjur Morshed, Bangladesh University of Engineering and Technology, Dhaka, Bangladesh, Titan Paul, University of South Carolina Aiken, Aiken, SC, United States, Jamil Khan, Univ Of South Carolina, Columbia, SC, United States*

**11:53am Heat Transfer Enhancement in Minichannel Flow**

Technical Paper Publication. IMECE2018-88539

*Luis Serrano, Universidad del Turabo, Villalba, PR, United States, Jose G. Pedro, Universidad del Turabo, Canovanas, PR, United States, Jahian Rodriguez, Universidad del Turabo, Cidra, PR, United States, Gerardo Carbajal, Universidad del Turabo, Caguas, PR, United States*

**10-55 K20-5 PANEL: HEAT TRANSFER AND FLUID FLOW ROUNDTABLE: NAVIGATING THE CODE LANDSCAPE?**

**10-55-2 Heat Transfer and Fluid Flow Roundtable: Navigating the Code Landscape**

**Third Floor, David L. Lawrence Convention Center, Room 327 10:50am - 12:35pm**

Session Chair: *Leitao Chen, Rice University, Houston, TX, United States*

**10:50am New Modeling tools for Gas Turbine Cooling and Aerodynamics**

Panel Presentation. IMECE2018-90066

*Leitao Chen, Rice University, Houston, TX, United States*

**11:42am Data-Driven Thermal Design Approaches**

Panel Presentation. IMECE2018-90067

*Leitao Chen, Rice University, Houston, TX, United States*

**10-56 K21-1 PANEL ON ADVANCEMENTS AND DISCUSSIONS IN HEAT TRANSFER AND THERMAL SCIENCE EDUCATION**

**10-56-1 Panel on Recent Advances in Heat Transfer Education**

**Third Floor, David L. Lawrence Convention Center, Room 325 10:50am - 12:35pm**

Session Chair: *Nesrin Ozalp, University of Minnesota Duluth, Duluth, MN, United States*

**10:50am Recent advancements and discussions in heat transfer and thermal science education**

Panel Presentation. IMECE2018-89067

*Patrick Oosthuizen, Queen's University, Kingston, QC, Canada*

**11:11am Recent advancements and discussions in heat transfer and thermal science education**

Panel Presentation. IMECE2018-89068

*Michael Pate, Texas A&M University, College Station, TX, United States*

**11:32am Advancements and discussions in heat transfer and thermal science education**

Panel Presentation. IMECE2018-89070

*Ashley Emery, University of Washington, Seattle, WA, United States*

**11:53am Panel on advancements and discussions in heat transfer and thermal science education**

Panel Presentation. IMECE2018-90084

*Brent Webb, Brigham Young Univ, Provo, UT, United States*

**10-14 K7-2 COMPUTATIONS OF THERMOPHYSICAL PROPERTIES**

**10-14-2 Calculations of Thermophysical Properties 2**

**Third Floor, David L. Lawrence Convention Center, Room 326 2:05pm - 3:50pm**

Session Chair: *Nicholas Roberts, Utah State University, Logan, UT, United States*

**2:05pm One, two, and three-dimensional crossover of the thermal transport in ZrTe5**

Technical Presentation. IMECE2018-86753

*Tianli Feng, Vanderbilt University, Oak Ridge, TN, United States, Sokrates Pantelides, Vanderbilt Univ, Nashville, TN, United States*

**2:26pm Thermal Characterization of Carbon Nanofiber Structures based on their Aspect Ratio**

Technical Presentation. IMECE2018-87558

*Amir Behbahanian, Nicholas Roberts, Utah State University, Logan, UT, United States*

**2:47pm Computation of Thermophysical Properties of Jet Impingement Heat Transfer**

Technical Presentation. IMECE2018-89519

**Anuj Kumar Shukla, ANUPAM DEWAN**, Indian Institute of Technology, Delhi, New Delhi, Delhi, India

**3:08pm Giant reduction of thermal transport in polyvinylidene fluoride under tensile strains**

Technical Presentation. IMECE2018-89789

**Tengfei Ma, Lei Cao, Yan Wang**, University of Nevada, Reno, Reno, NV, United States

**3:29pm Anomalous Temperature-Dependent Thermal Conductivity of Monolayer GaN with Large Deviations from the Traditional 1/T Law**

Technical Presentation. IMECE2018-89008

**Guangzhao Qin**, University of South Carolina, Columbia, SC, United States, **Zhenzhen Qin**, Zhengzhou University, Zhengzhou, Henan, China, **Huimin Wang**, Northeastern University, Shenyang, Liaoning, China, **Ming Hu**, University of South Carolina, Columbia, SC, United States

**10-29 K9-9 NANOSCALE HEAT TRANSPORT IN PRACTICAL SYSTEMS**

**10-29-1 Heat Conduction in 2D Materials/Devices**

Third Floor, David L. Lawrence Convention Center, Room 324 2:05pm - 3:50pm

Session Chair: **Sanjiv Sinha**, University of Illinois, Urbana, IL, United States

Session Co-Chair: **Yaguo Wang**, Univ. of Texas, Austin, TX, United States, **Michael Pettes**, LANL MPA-CENT, Albuquerque, NM, United States

**2:05pm Phonon Hydrodynamic Viscosity in Suspended Graphene**

Technical Presentation. IMECE2018-89594

**Xun Li, Sangyeop Lee**, University of Pittsburgh, Pittsburgh, PA, United States

**2:26pm Crossover of Phonon Transport Regimes in Suspended Graphene**

Technical Presentation. IMECE2018-89595

**Xun Li, Sangyeop Lee**, University of Pittsburgh, Pittsburgh, PA, United States

**2:47pm Exploring Nanoscale Heat Transport in Emerging High Thermal Conductivity Materials for Advanced Thermal Management**

Technical Presentation. IMECE2018-86051

**Joon Sang Kang, Huan Wu, Man Li, Yongjie Hu**, University of California, Los Angeles (UCLA), Los Angeles, CA, United States

**3:08pm Nanoscale Heat Transfer and Phonon Spectral Mapping in Novel 2D materials for Thermal Regulation and Energy Harvesting**

Technical Presentation. IMECE2018-86054

**Joon Sang Kang, Man Li, Ming Ke, Yongjie Hu**, University of California, Los Angeles (UCLA), Los Angeles, CA, United States

**3:29pm Two-Dimensional Heat Transfer Considerations for Thermorefectance Measurements**

Technical Paper Publication. IMECE2018-88657

**Dipta Sarkar, Partha P. Chakraborty**, Kansas State University, Manhattan, KS, United States, **B. Terry Beck**, Kansas State Univ, Manhattan, KS, United States, **Zayd Leseman**, Kansas State University, Manhattan, KS, United States

**10-30 K10-1 SINGLE-PHASE ENHANCED HEAT TRANSFER ? NUMERICAL STUDIES**

**10-30-1 Single-Phase Enhanced Heat Transfer - Numerical Studies - II**

Fourth Floor, David L. Lawrence Convention Center, Room 406 2:05pm - 3:50pm

Session Chair: **Maulik Shelat**, Praxair, Williamsville, NY, United States

**2:05pm An Eight-Passage Serpentine Design for Negating Coriolis Force Effect on Heat Transfer**

Technical Paper Publication. IMECE2018-86354

**Prashant Singh, Srinath Ekkad**, North Carolina State University, Raleigh, NC, United States

**2:26pm High Porosity and High Pore Density Thin Copper Foams for Compact Electronics Cooling**

Technical Paper Publication. IMECE2018-86355

**Sanskar Panse, Prashant Singh, Srinath Ekkad**, North Carolina State University, Raleigh, NC, United States

**2:47pm Thermohydraulic Effect of Aspect Ratio on Combination Angled Dimpled in a Rectangular Channel**

Technical Paper Publication. IMECE2018-86558

**Samson A AASA**, University of Johannesburg, Johannesburg, Gauteng, South Africa, **Tien-Chien Jen**, Univ Of Johannesburg, Johannesburg, South Africa

**3:08pm A Numerical Analysis of Heat Transfer Enhancement by Turbulence Generated From Swirl Flow by Twisted Tape**

Technical Paper Publication. IMECE2018-86616

**Muhammad Azmain Abdullah**, City University, Dhaka, Dhaka, Bangladesh, **M. Ruhul Amin**, Montana State Univ, Bozeman, MT, United States, **Mohammad Ali**, Bangladesh University of Engineering and Technology, Dhaka, Select State/Province, Bangladesh

Draft Program

**10-50 K19-3 HEAT TRANSFER IN HVAC SYSTEMS AND AIR QUALITY AND COMFORT IN CONFINED SPACES**

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**10-50-1 Heat Transfer in HVAC Systems and Air Quality and Comfort in Confined Spaces**

**Third Floor, David L. Lawrence Convention Center, Room 325 2:05pm - 3:50pm**

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Session Chair: **Kashif Nawaz**, *Oak Ridge National Laboratory | ORNL, Oak Ridge, TN, United States*  
Session Co-Chair: **S.A. Sherif**, *University of Florida, Gainesville, FL, United States*, **Michael Pate**, *Texas A&M University, College Station, TX, United States*

**2:05pm Cooling Systems for Refuge Alternatives in Hot Mine Conditions**

Technical Paper Publication. IMECE2018-87507

**Lincan Yan**, **David Yantek**, **Miguel Reyes**, **Nicholas Damiano**, **Justin Srednicki**, **Joseph Bickson**, **Bruce Whisner**, *CDC/NIOSH, Pittsburgh, PA, United States*, **Eric Bauer**, *BCS Life Support LLC, Titusville, FL, United States*

**2:26pm An Embedded Mechatronic Device for Real-Time Monitoring and Prediction of Occupants' Thermal Comfort**

Technical Paper Publication. IMECE2018-87632

**Boris Pavlin**, **Giovanni Carabin**, **Giovanni Pernigotto**, **Renato Vidoni**, **Andrea Gasparella**, *Free University of Bolzano, Bolzano, Italy*

**2:47pm Net-Zero Water (NZW) Reuse Desiccant Assisted Evaporative Cooling System For Data Centers**

Technical Presentation. IMECE2018-89738

**David Okposio**, *Purdue University Northwest, Hammond, IN, United States*, **A. G. Agwu Nnanna**, *University of Texas of the Permian Basin, Odessa, TX, United States*

**3:08pm Sublimating Paradichlorobenzene Spheres in a Natural Convection Environment**

Technical Presentation. IMECE2018-86427

**William S. Janna**, *University of Memphis, Memphis, TN, United States*, **Willi P. Anderson**, *University of Tennessee Knoxville, Knoxville, TN, United States*, **Jeffrey G. Marchetta**, *University of Memphis, Memphis, TN, United States*, **William Janna**, *Univ Of Memphis, Memphis, TN, United States*

**3:29pm Thermal Properties of a Concrete Aerogel Paste Composite**

Technical Paper Publication. IMECE2018-88660

**Chris Kobus**, *Oakland Univ, Rochester, MI, United States*, **J. David Schall**, *Oakland University, Rochester, MI, United States*

**10-61 K8-7 FUNDAMENTALS OF BOILING AND CONDENSATION ? II**

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**10-61-1 K8-7 Fundamentals of Boiling and Condensation - II-B**

**Third Floor, David L. Lawrence Convention Center, Room 323 2:05pm - 3:50pm**

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Session Chair: **Sajjad Bigham**, *Michigan Technological University, Houghton, MI, United States*  
Session Co-Chair: **Enakshi Wikramanayake**, *The University of Texas At Austin, Austin, TX, United States*

**2:05pm Theoretical Analysis of Moisture Condensation on a Cold Heat Sink**

Technical Paper Publication. IMECE2018-86228

**RUN YAN**, **Hongbin Ma**, *University of Missouri, Columbia, MO, United States*

**2:26pm Membranes for microscale phase separation of completely wetting liquids**

Technical Presentation. IMECE2018-88296

**Mojtaba Hosseinnia**, *Michigan Tech University, HOUGHTON, MI, United States*, **Sajjad Bigham**, *Michigan Technological University, Houghton, MI, United States*

**2:47pm Sucking-Flow Condensation Heat Transfer on Hierarchical Structured Surfaces**

Technical Presentation. IMECE2018-87265

**Rongfu Wen**, **Yung-Cheng Lee**, *University of Colorado Boulder, Boulder, CO, United States*, **Yonghui Yang**, *University of Colorado, Boulder, CO, United States*

**3:08pm Critical Radius of Bubble Nucleation in Pool Boiling**

Technical Presentation. IMECE2018-88972

**Manish Gupta**, **Shalabh Maroo**, *Syracuse University, Syracuse, NY, United States*

**10-62 K10-3 SINGLE-PHASE ENHANCED HEAT TRANSFER ? APPLICATIONS AND EXPERIMENTS**

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**10-62-1 Single-Phase Enhanced Heat Transfer - Applications**

**Third Floor, David L. Lawrence Convention Center, Room 327 2:05pm - 3:50pm**

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Session Chair: **Mark Kedzierski**, *NIST, Gaithersburg, MD, United States*

Session Co-Chair: **Kashif Nawaz**, *Oak Ridge National Laboratory | ORNL, Oak Ridge, TN, United States*, **Yaroslav Chudnovsky**, *Gas Technology Institute, Des Plaines, IL, United States*

Draft Program

**2:05pm Heat Transfer Augmentation From Extended Surface Using Dimples**

Technical Paper Publication. IMECE2018-87345

*Jay Mehta, Fay Nicole Colah, Anurag Rao, Vineeta Pendse, University of Mumbai, Mumbai, Maharashtra, India, Vyankatesh Bagal, Dwarkadas J. Sanghvi College of Engineering, Mumbai, Maharashtra, India, Kevin Ajmera, University of Mumbai, Mumbai, Maharashtra, India*

**2:26pm An Experimental and Numerical Study of Heat Transfer and Flow Characteristics of Laminar Flow in a Circular Tube With Wedge-Shaped Wavy-Tape Inserts**

Technical Paper Publication. IMECE2018-88335

*Yunmin Liang, Peng Liu, Nianben Zheng, Feng Shan, zhichun liu, Wei Liu, Huazhong Univ. of Sci. & Tech, China, Wuhan, — Select One —, China*

**2:47pm Heat Transfer by a Rotating Liquid Jet Impingement Cooling System**

Technical Paper Publication. IMECE2018-88377

*Qi Lu, Texas Tech University, Lubbock, TX, United States, Sivapathas Parameswaran, Texas Tech Univ, Lubbock, TX, United States, Beibei Ren, Texas Tech University, Lubbock, TX, United States*

**3:08pm Waterblock Modelling for GPU Liquid Cooling**

Technical Paper Publication. IMECE2018-88567

*Jose-Carlos Vargas-Vazquez, Jose-Angel Gutierrez-Garcia, University of Guanajuato, Salamanca, Guanajuato, Mexico, Luis Luviano-Ortiz, University of Guanajuato, Salamanca/Guanajuato, Guanajuato, Mexico, Abel Hernandez-Guerrero, University of Guanajuato, Salamanca, Guanajuato, Guanajuato, Mexico, Jose-Luis Zuñiga-Cerroblando, Valentín Rojas, Polytechnic University, Guanajuato, Aguascalientes, Mexico*

**3:29pm Correlating Friction Factors and Nusselt Numbers for Laminar Simultaneously Developing Flow in Rectangular Plain Plate-Fin Channels**

Technical Presentation. IMECE2018-89137

*Kuan-Ting Lin, Dantong Shi, Milind Jog, Raj M. Manglik, University of Cincinnati, Cincinnati, OH, United States*

**10-1 GENERAL**

**10-1-1 Analysis of Thermal Systems**

**Third Floor, David L. Lawrence Convention Center, Room 325 4:00pm - 5:45pm**

Session Chair: **Kevin Dowding**, Sandia National Laboratories, Albuquerque, NM, United States

**4:00pm CFD Modelling of Counter-Current Packed Bed for HDH Desalination System**

Technical Presentation. IMECE2018-89749

*Clement Roy, James Klausner, Michigan State University, East Lansing, MI, United States, Andre Benard, Michigan State Univ, East Lansing, MI, United States, Sina Jahangirimamouri, Michigan State University, East Lansing, MI, United States*

**4:21pm Experimental Investigation of Heat/Mass Transfer and Pressure Drop in a Multi-string Humidifier**

Technical Presentation. IMECE2018-89274

*ZeZhi Zeng, UCLA, Los Angeles, CA, United States, Abolfazl Sadeghpour, Y. Sungtaek Ju, University of California, Los Angeles (UCLA), Los Angeles, CA, United States*

**4:42pm Measurement of Heat Transfer Coefficient in Interaction Zone of Multiple Liquid Jet Impingements**

Technical Presentation. IMECE2018-89186

*Chaitanya Ghodake, Bharat Forge, Pune, maharashtra, India*

**5:03pm Numerical Study of Forced Convection in Different Fluids From Stationary Heated Cylinders in a Square Enclosure**

Technical Paper Publication. IMECE2018-87032

*Srishti Mishra, Mukul Tomar, Adeel Ahmad, Satvik Jain, Naveen Kumar, Delhi Technological University, Delhi, India*

**10-28 K9-8 ADVANCES IN SIMULATION METHODS**

**10-28-1 K9-8 Advances in simulation methods**

**Third Floor, David L. Lawrence Convention Center, Room 324 4:00pm - 5:45pm**

Session Chair: **Dong Liu**, University of Houston, Houston, TX, United States

**4:00pm Prediction of four-phonon scattering and related thermal properties**

Invited Presentation. IMECE2018-89439

*Tiancheng Purdie, Purdue University, West Lafayette, IN, United States, Lucas Lindsay, Oak Ridge National Lab, Oak Ridge, TN, United States, Xiulin Ruan, Purdue Univ, West Lafayette, IN, United States*

**4:42pm Mapping of Phonon Modes Between Two-Dimensional and Three-Dimensional Systems**

Technical Presentation. IMECE2018-86938

*Hyun-Young Kim, Carnegie Mellon University, Pittsburgh, PA, United States, Alan McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States*

**5:03pm Quantifying uncertainty in first-principles predictions of phonon dispersion relations**

Technical Presentation. IMECE2018-89140

*Holden Parks, Venkat Viswanathan, Carnegie Mellon University, Pittsburgh, PA, United States, Alan McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States*

**5:24pm Determining Influential Descriptors for Polymer Chain Conformation Based on Empirical Force-fields and Molecular Dynamics Simulations**

Technical Presentation. IMECE2018-86305

*RUIMIN MA, University of Notre Dame, South Bend, IN, United States, Tengfei Luo, University of Notre Dame, Notre Dame, IN, United States*

Draft Program

**10-30 K10-1 SINGLE-PHASE ENHANCED HEAT TRANSFER ? NUMERICAL STUDIES**

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**10-30-3 Single-Phase Enhanced Heat Transfer - Numerical Studies - III**

**Fourth Floor, David L. Lawrence Convention Center, Room 406 4:00pm - 5:45pm**

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Session Chair: **Sandra Boetcher**, *Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

**4:00pm Three-Tier Impingement Cooling Design for Gas Turbine Blade Trailing Edge**

**Technical Paper Publication.** IMECE2018-86430  
**Kishore Ranganath Ramakrishnan, Prashant Singh, Srinath Ekkad**, *North Carolina State University, Raleigh, NC, United States*

**4:21pm Experimental Investigation of Heat Transfer Enhancement Through Array Jet Impingement on Various Configurations of High Porosity Thin Metal Foams**

**Technical Paper Publication.** IMECE2018-86432  
**Srivatsan Madhavan, Prashant Singh, Srinath Ekkad**, *North Carolina State University, Raleigh, NC, United States*

**4:42pm Heat Dissipator With Aztec Inspired Radial Geometry**

**Technical Paper Publication.** IMECE2018-88570  
**Alheli Perez-Hernandez**, *University of Guanajuato, Salamanca, Guanajuato, Mexico*, **Luis Carrasco-Ortiz**, *University of Guanajuato, Salamanca/Guanajuato, Guanajuato, Mexico*, **Abe Hernandez-Guerrero**, *University of Guanajuato, Salamanca, Guanajuato, Guanajuato, Mexico*, **Israel Botello-Arredondo**, *Universidad Autónoma de Ciudad Juárez, Ciudad Juarez, Chihuahua, Mexico*

**10-61 K8-7 FUNDAMENTALS OF BOILING AND CONDENSATION ? II**

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**10-61-2 K8-7 Fundamentals of Condensation, Transient Boiling, and Dehumidification**

**Third Floor, David L. Lawrence Convention Center, Room 323 4:00pm - 5:45pm**

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Session Chair: **Alexander Rattner**, *The Pennsylvania State University, University Park, PA, United States*

Session Co-Chair: **Enakshi Wikramanayake**, *The University of Texas At Austin, Austin, TX, United States*

**4:00pm Heat Transfer During Condensing Droplet Coalescence**

**Technical Presentation.** IMECE2018-87618  
**Sanjay Adhikari, Alexander Rattner**, *The Pennsylvania State University, University Park, PA, United States*

**4:21pm Cavitation Corrosions in Capillary Pulsating Heat Pipe**

**Technical Paper Publication.** IMECE2018-88088  
**Steve Cai**, *Independent Author, Manlius, NY, United States*

**4:42pm Development of In-Water, Transient Boiling Detector**

**Technical Presentation.** IMECE2018-88932  
**Ezekiel Villarreal**, *University of Pittsburgh, Pittsburgh, PA, United States*, **Austin Fleming**, **Eric D Larsen**, **Colby Jensen**, *Idaho National Laboratory, Idaho Falls, ID, United States*, **Heng Ban**, *University of Pittsburgh, Pittsburgh, PA, United States*

**5:03pm Sodium Pumping via Condensation within a Non-Wetting Porous Structure**

**Technical Presentation.** IMECE2018-89197  
**Alexander Limia**, **Peter Kottke**, **Ritesh Bhatt**, **Andrei G. Fedorov**, *Georgia Institute of Technology, Atlanta, GA, United States*, **Shannon K. Yee**, *Georgia Tech, Atlanta, GA, United States*

**5:24pm Multi-string Dehumidifier, an Experimental Study**

**Technical Presentation.** IMECE2018-89491  
**Abolfazl Sadeghpour**, *University of California, Los Angeles (UCLA), Los Angeles, CA, United States*, **Zezi Zeng**, *UCLA, Los Angeles, CA, United States*, **Y. Sungtaek Ju**, *University of California, Los Angeles (UCLA), Los Angeles, CA, United States*

**5:45pm Reducing Contact Time of a Bouncing Drop in Janus State**

**Technical Presentation.** IMECE2018-87279  
**Chu-Yao Chou**, **Venkataraman Sahoo**, *National Chiao Tung University, Hsinchu, Taiwan*, **Ching-Wen Lo**, *National Chiao Tung University, Hsin Chu, Taiwan*, **Ming-Chang Lu**, *National Chiao Tung University, Hsinchu, OO, Taiwan*

**10-63 K10-4 MULTI-PHASE AND PASSIVE ENHANCED HEAT TRANSFER**

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**10-63-1 Multi-Phase and Passive Enhanced Heat Transfer**

**Third Floor, David L. Lawrence Convention Center, Room 327 4:00pm - 5:45pm**

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Session Chair: **Kashif Nawaz**, *Oak Ridge National Laboratory | ORNL, Oak Ridge, TN, United States*

**4:00pm Natural Convection Heat Transfer With Horizontal Rectangular Fin Array Using Straight Knurling Patterns on Fins: An Experimental Study**

**Technical Paper Publication.** IMECE2018-86449  
**Rahul Chikurde**, **Basavraj Kothavale**, *MAEER'S - MIT COE, Pune, Maharashtra, India*, **Narayan Sane**, *Walchand College of Engineering, Sangli, India*

**4:21pm Numerical Study of Microencapsulated Phase Change Material Slurries**

**Technical Presentation.** IMECE2018-86681  
**Jonathan Young**, *Western New England University, Ludlow, MA, United States*, **Anthony Santamaria**, **Jingru Benner**, *Western New England University, Springfield, MA, United States*

**4:42pm** Natural Convection in a Square Cavity Utilizing Different Nanofluids in Presence of Constant Magnetic Field With Brownian Motion Effect

Technical Paper Publication. IMECE2018-87123

*Misarah Abdelaziz, Alexandria University, Alexandria, other, Egypt, Wael El-Maghlany, Faculty of Engineering, Alexandria University, Alexandria, other, Egypt, Ashraf S. Ismail, Alexandria University, Faculty of Engineering, Alexandria, Select State/Province, Egypt*

**5:03pm** Pool Boiling Heat Transfer Enhancement of Water by Gold Nanoparticles With an Electrophoretic Deposition Method

Technical Paper Publication. IMECE2018-87356

*Zhen Cao, Anh Duc Pham, Zan Wu, Lund University, Lund, Select State/Province, Sweden, Tautgirdas Ruzgas, Cathrine Albèr, Malmö University, Malmö, Sweden, Bengt Sundén, Lund University, Lund, Sweden*

**5:24pm** Experimental Study of Convective Heat Transfer in Standard and Cross-Drilled Brake Discs With Radial Vane and X-Lattice Cores

Technical Paper Publication. IMECE2018-86195

*Hongbin Yan, Northwestern Polytechnical University, Xi'an, China, Shangsheng Feng, Xi'an Jiaotong University, Xi'an, China, Wei-Tao Wu, Nanjing University of Science and Technology, Nanjing, China, Tian Jian Lu, Xi'an Jiaotong University, Xi'an, China, Gongnan Xie, Northwestern Polytechnical University, Xi'an, China*

**Materials: Genetics to Structures**  
**MONDAY, NOVEMBER, 12**

**Draft Program**

## 11-2 NANOMATERIALS FOR ENERGY

### 11-2-1 Nanomaterials for Energy I

Room 328 9:45am - 11:30am

Session Chair: **Michael Pettes**, *University of Connecticut, Storrs, CT, United States*

Session Co-Chair: **Arunkumar Subramanian**, *University of Illinois at Chicago, Glen Allen, VA, United States*

**9:45am** Understanding Processing dependent Morphology of P3HT:PCBM Bulk-heterojunction Thin Films by Coarse-grained Molecular Simulations

Technical Presentation. IMECE2018-86438

*Joydeep Munshi, Lehigh University, Bethlehem, PA, United States, Wei Chen, Northwestern University, Evanston, IL, United States, TeYu Chien, University of Wyoming, Laramie, WY, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States*

**10:06am** Thermal Characteristic Study on Si-Ge Heterostructure Interface Formed by Film-Wafer Bonding

Technical Presentation. IMECE2018-86443

*Sien Wang, Dongchao Xu, Yue Xiao, Qing Hao, University of Arizona, Tucson, AZ, United States*

**10:27am** Electrochemical-Mechanical Modeling and Degradation Analysis of Li-ion Batteries: Part I

Technical Presentation. IMECE2018-87409

*Wei Lu, Univ Of Michigan, Ann Arbor, MI, United States*

**10:48am** Electrochemical-Mechanical Modeling and Degradation Analysis of Li-ion Batteries: Part II

Technical Presentation. IMECE2018-87410

*Wei Lu, Univ Of Michigan, Ann Arbor, MI, United States*

**11:09am** Stabilization of Graphene Dispersions by Cellulose Nanocrystals Colloids

Technical Paper Publication. IMECE2018-87830

*Danny Illera, Universidad Del Norte, Barranquilla, Colombia, Chatura Wickramaratne, Diego Guillen, Chand Jotshi, University of South Florida, Tampa, FL, United States, Humberto Gomez, Universidad del Norte, Barranquilla, Colombia, D. Yogi Goswami, Univ Of South Florida, Tampa, FL, United States*

## 11-7 FRACTURE AND DAMAGE: NANO- TO MACRO-SCALE

### 11-7-1 Fracture and Damage: Nano- to Macro-Scale I

Room 329 9:45am - 11:30am

Session Chair: **Raghu Prakash**, *Indian Institute of Technology Madras, Chennai, India*

Session Co-Chair: **Robabeh Jazaei**, *University of Nevada, Las Vegas, Las Vegas, NV, United States*

**9:45am** Effect of Hold Time Interspersed With Cyclic Loading on Corrosion Fatigue Crack Growth Rate of a Steel in Sodium Chloride Solution

Technical Paper Publication. IMECE2018-86417

*Raghu Prakash, Indian Institute of Technology Madras, Chennai, India, Dhinakaran Sampath, University of Manchester, Manchester, United Kingdom*

**10:06am** Degradation of the Strength of a Grain and a Grain Boundary due to the Accumulation of the Structural Defects of Crystal

Technical Paper Publication. IMECE2018-87264

*Guoxiong Zheng, Yifan Luo, Tohoku University, Sendai, Miyagi, Japan, Hideo Miura, Tohoku University, Sendai 980-8579, Miyagi, Japan*

**10:27am** Crystallinity-Induced Variation of the Electronic Characteristics of Electroplated Gold Thin Films

Technical Paper Publication. IMECE2018-87278

*yutaro nakoshi, Tohoku university, Aoba-ku, sendai, Japan, Hideo Miura, Tohoku University, Sendai 980-8579, Miyagi, Japan*

**10:48am** A Crack Detection and Evaluation Method for Self-Piercing Riveting

Technical Paper Publication. IMECE2018-88403

*Xuyang Wang, Yudong Fang, Chongqing University, Chongqing, China, Zhenfei Zhan, Chongqing University, Livonia, MI, United States*

**11:09am** Energy Absorption of Cementitious Composite Incorporating Polypropylene and Cold-Drawn Shaved Steel Fiber under Low-Velocity Impact Test

Technical Presentation. IMECE2018-88514

*Robabeh Jazaei, Samad Gharehdaghi, Fatemeh Azari, University of Nevada, Las Vegas, Las Vegas, NV, United States*

## **11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES**

**11-8-1 Material Processing of Flexible Electronics, Sensors, and Devices I**

**Room 330 9:45am - 11:30am**

Session Chair: **Cunjiang Yu**, University of Houston, Houston, TX, United States

Session Co-Chair: **Jianliang Xiao**, University of Colorado Boulder, Boulder, CO, United States

**9:45am** Flexible, stretchable and healable electronics Invited Presentation. IMECE2018-89522

*Fabio Cicoira, Polytechnique Montréal, Montréal, QC, Canada*

**10:27am** Fully Rubbery Integrated Electronics and Sensors

Technical Presentation. IMECE2018-89840

*Cunjiang Yu, Kyoseung Sim, University of Houston, Houston, TX, United States*

**10:48am** Motion Artifact Free Monitoring of EMG/ECG Biopotentials Using Sub-370 nm per-Artesiv Laser Ultra-Conformable Au/Parylene Thin Film Electrodes

Technical Presentation. IMECE2018-89610

*Robert Nawrocki, Purdue University, West Lafayette, IN, United States, Hanbit Jin, Sunghoon Lee, Tomoyuki Yokota, Masaki Sekino, Takao Someya, University of Tokyo, Tokyo, Japan*

**11:09am** Transparent, Stretchable Conductor with Direct Laser Writing

Technical Presentation. IMECE2018-89805

*Chengfeng Pan, Kitty Kumar, Carnegie Mellon University, Pittsburgh, PA, United States, Jianzhao Li, University of Toronto, Toronto, ON, Canada, Eric Markvicka, Carnegie Mellon University, Pittsburgh, PA, United States, Peter Herman, University of Toronto, Toronto, ON, Canada, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States*

## **11-11 MODELING, SIMULATION, AND DESIGN OF MULTIFUNCTIONAL MATERIALS**

**11-11-1 Modeling, Simulation and Design of Multifunctional Materials 1**

**Room 407 9:45am - 11:30am**

Session Chair: **Ling Liu**, Utah State Univ, Logan, UT, United States

Session Co-Chair: **Charles Wojnar**, Missouri S&T, Rolla, MO, United States, **Zhenhai Xia**, University of North Texas, Denton, TX, United States

**9:45am** Metal-Organic-Frameworks as Efficient Electrocatalysts for Oxygen Evolution Reaction: Insights into the Active Centers

Technical Presentation. IMECE2018-86624

*Chun-Yu Lin, University of North Texas, Denton, TX, United States, Shuangyin Wang, Hunan University, Changsha, China, Zhenhai Xia, University of North Texas, Denton, TX, United States*

**10:06am** Dimensional control of defect dynamics in perovskite oxide superlattices

Technical Presentation. IMECE2018-89356

*Lipeng Zhang, Beijing University of Chemical Technology, Beijing, China, Haixuan Xu, University of Tennessee, Knoxville, TN, United States, Isaac Bredeson, University of Tennessee, Knoxville, TN, United States, Valentino R Cooper, Paul R Kent, Oak Ridge national Lab, Oak Ridge, TN, United States*

**10:27am** Numerical Investigation on Percolation Threshold of CNT-Reinforced Conductive Composites Based on Three-Dimensional Monte Carlo Method

Technical Paper Publication. IMECE2018-86794

*Zhuangzhuang He, Lijun Li, Beihang University, Beijing, China, Taikun Wang, Yantao Wang, Henan Key Laboratory of Underwater Intelligent Equipment, Zhengzhou Electromechanical Engineering Re, Zhengzhou, China, Xudong Yang, Wenming Yang, Beihang university, Beijing, China*

**10:48am** Dexterous Hybrid Robotics for High Precision Applications

Technical Paper Publication. IMECE2018-86856

*Mitch Crowther, Nolan Jackson, Minchul Shin, Georgia Southern University, Statesboro, GA, United States*

**11:09am** Uncertainty Quantification of Artificial Neural Network Based Machine Learning Potentials

Technical Paper Publication. IMECE2018-88071

*Yumeng Li, University of Illinois At Urbana-Champaign, Urbana, IL, United States, Weirong Xiao, UIUC, Urbana, IL, United States, Pingfeng Wang, University of Illinois At Urbana-Champaign, Urbana, IL, United States*

## **11-2 NANOMATERIALS FOR ENERGY**

**11-2-2 Nanomaterials for Energy II**

**Room 328 1:45pm - 3:30pm**

Session Chair: **Arunkumar Subramanian**, University of Illinois at Chicago, Glen Allen, VA, United States

Session Co-Chair: **Michael Pettes**, University of Connecticut, Storrs, CT, United States

**1:45pm** Energy Sensitivity of Charge Carriers for Detecting Scattering and Transport

Technical Presentation. IMECE2018-88970

*Shuang Tang, State University of New York, Utica, NY, United States*

**2:06pm Guiding Principles for Designing Highly-Efficient Metal-free Carbon Catalysts**

Technical Presentation. IMECE2018-89358

*Lipeng Zhang, Beijing University of Chemical Technology, Beijing, China, Zhenhai Xia, University of North Texas, Denton, TX, United States*

**2:27pm ADVANCED FeOOH-MWCNTS COMPOSITE NEGATIVE ELECTRODES WITH HIGH AREAL CAPACITANCE FOR ASYMETRIC SUPERCAPACITORS**

Technical Presentation. IMECE2018-89814

*Ri Chen, Rakesh Sahu, Igor Zhitomirsky, McMaster University, Hamilton, ON, Canada, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

**2:48pm Entropy Generation Minimization in Polyurethane Silica Nano-composite Membrane**

Technical Presentation. IMECE2018-89848

*Omar Almahmoud, Tae-Youl Choi, University of North Texas, Denton, TX, United States*

**3:09pm Oxygen and Water Vapor Effects on Photoelectronic Properties of Monolayer Tungsten Disulfide via Chemical Vapor Deposition**

Technical Presentation. IMECE2018-89869

*Hanyu Zhang, National Renewable Energy Laboratory (NREL), Golden, CO, United States, Jeremy Dunklin, Obadiah Reid, Sanjini Nanayakkara, Jeffrey Blackburn, Elisa M Link, NREL, Golden, CO, United States*

**11-7 FRACTURE AND DAMAGE: NANO- TO MACRO-SCALE**

**11-7-2 Fracture and Damage: Nano- to Macro-Scale II**

**Room 329 1:45pm - 3:30pm**

Session Chair: **Eric Markvicka**, Carnegie Mellon University, Pittsburgh, PA, United States

Session Co-Chair: **Ram Mohan**, North Carolina A & T University, Greensboro, NC, United States

**1:45pm Tensile Deformation Mechanisms in Nickel-Cobalt Core-Shell Nanowires via Molecular Dynamics Simulations**

Technical Presentation. IMECE2018-89138

*Ali Shiave, University of North Carolina at Greensboro, Greensboro, NC, United States, Ram Mohan, North Carolina A & T University, Greensboro, NC, United States*

**2:06pm Stiffness percolation at high crack densities: Fragmentation and Interlocking**

Technical Presentation. IMECE2018-89298

*Anirban Pal, Rensselaer Polytechnic Institute, Troy, NY, United States, Catalin Picu, Rensselaer Polytechnic Inst, Troy, NY, United States*

**2:27pm Damage detection and localization in soft-matter systems**

Technical Presentation. IMECE2018-89585

*Eric Markvicka, Carnegie Mellon University, Pittsburgh, PA, United States, Michael D. Bartlett, Ravi Tutika, Iowa State University, Ames, IA, United States, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States*

**2:48pm Investigating Damage Initiation Sites in Metallic Microstructures Using Atomistic Modeling of Interfaces**

Technical Presentation. IMECE2018-89613

*Jacob Tavenner, Colorado School of Mines, Golden, CO, United States, Ian Bakst, Colorado State University, Fort Collins, CO, United States, Garritt Tucker, Colorado School of Mines, Golden, CO, United States, Christopher Weinberger, Colorado State University, Fort Collins, CO, United States*

**3:09pm Influences of Plasticity-Induced Crack Closure on Fatigue Crack Healing of Carbon Steel With Heat Treatment**

Technical Paper Publication. IMECE2018-86650

*Eiichi Hamada, Yuto Furuya, Atsushi Hosoi, Waseda University, Tokyo, Shinjuku, Japan, Yuji Morita, Nippon Pneumatic Mfg. Co., Ltd., Mie, Nabari, Japan, Hiroyuki Kawada, Waseda University, Tokyo, Shinjuku, Japan*

**11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES**

**11-8-2 Material Processing of Flexible Electronics, Sensors, and Devices II**

**Room 330 1:45pm - 3:30pm**

Session Chair: **Jianliang Xiao**, University of Colorado Boulder, Boulder, CO, United States

Session Co-Chair: **Qiming Wang**, University of Southern California, Los Angeles, CA, United States

**1:45pm Performance of electrical and electrochemical flexible devices**

Invited Presentation. IMECE2018-89411

*Luis Pereira, CENIMAT/13N, Caparica, -, Portugal*

**2:27pm Nanoporous Paper-based Electrodes for Biosensing**

Technical Presentation. IMECE2018-89592

*Ramendra Pal, Tongfen Liang, Thomas McGovern, Samantha Moy, Mehdi Javanmard, Rutgers University, Piscataway, NJ, United States, Aaron Mazzeo, Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

**2:48pm Rehealable, fully recyclable and malleable electronic skin**

Technical Presentation. IMECE2018-89028

*Zhanan Zou, Jianliang Xiao, Wei Zhang, University of Colorado Boulder, Boulder, CO, United States*

**3:09pm A Field Deployable Biosensor for Virus Detection using DNA Hybridization**

Technical Presentation. IMECE2018-89833

*Jessica Snyder, Trevor Kalkus, Universities Space Research Association (USRA), Sunnyvale, CA, United States, Jessica Urbina, Nils Aversch, Universities Space Research Association (USRA), Mountain View, CA, United States, David Biebert, US Geological Survey, Madison, WI, United States, Lynn Rothschild, NASA, Moffett Field, CA, United States*

## 11-11 MODELING, SIMULATION, AND DESIGN OF MULTIFUNCTIONAL MATERIALS

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### 11-11-2 Modeling, Simulation and Design of Multifunctional Materials 2

**Room 407 1:45pm - 3:30pm**

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Session Chair: **Ling Liu**, *Utah State Univ, Logan, UT, United States*  
Session Co-Chair: **Charles Wojnar**, *Missouri S&T, Rolla, MO, United States*, **Zhenhai Xia**, *University of North Texas, Denton, TX, United States*

#### 1:45pm A MultiPhysics Thermoelastoviscoplastic Damage Coupled with a Magnetism Internal State Variable Model

Technical Presentation. IMECE2018-87945

**Mounia MALKI**, *Mississippi State University, Starkville, MS, United States*, **Mark Horstemeyer**, *Mississippi State Univ, Starkville, MS, United States*, **Michael Baskes**, *Mississippi State University, Starkville, MS, United States*, **Yucheng Liu**, *Mississippi State University, Mississippi State, MS, United States*, **Lei Chen**, *Mississippi State University, Starkville, MS, United States*

#### 2:06pm Viscoelastic Behavior of Carbon Nanotube Yarns and Twisted Coils

Technical Paper Publication. IMECE2018-88095

**Pouria Khanbolouki**, **Mehran Tehrani**, *University of New Mexico, Albuquerque, NM, United States*

#### 2:27pm Multi-field, Multi-layer, and Segmented Composite Beam Optimization for Shale Work, in Cost

Technical Presentation. IMECE2018-89913

**Anil Erol**, *The Pennsylvania State University, University Park, PA, United States*, **Mary Frecker**, *Pennsylvania State Univ, University Park, PA, United States*, **Paris Von Lockette**, *Penn State University, University Park, PA, United States*

#### 2:48pm A Thermo-Electro-Elasto-Viscoplastic Damage Internal State Variable (ISV) Model for Ductile Metals

Technical Paper Publication. IMECE2018-86598

**Nikolay Dimitrov**, *Mississippi State University, Starkville, MS, United States*, **Yucheng Liu**, *Mississippi State University, Mississippi State, MS, United States*, **Mark Horstemeyer**, *Mississippi State Univ, Starkville, MS, United States*

#### 3:09pm Hybrid Alumina Composites for Cutting Tool Inserts: Material Design and Development

Technical Paper Publication. IMECE2018-87255

**Taha Waqar**, *King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, Saudi Arabia*, **Syed Sohail Akhtar**, *Department of Mechanical Engineering, King Fahad University of Petroleum & Miner, Dhahran, Saudi Arabia*, **Abul Fazal M. Arif**, *King Fahd Univ of Petroleum & Minerals (KFUPM), Dhahran, Saudi Arabia*, **Khaled Al-Athel**, *King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia*

## 11-4 MATERIALS AND 3D PRINTING FOR BIOLOGY AND MEDICINE

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### 11-4-1 Materials and 3D Printing for Biology and Medicine

**Room 407 3:45pm - 5:30pm**

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Session Chair: **Lijie Grace Zhang**, *The George Washington University, Washington, DC, United States*

#### 3:45pm 3D Printed Shape-Changing Cardiovascular Implants for Accommodating Growth

Technical Presentation. IMECE2018-89032

**Ozan Erol**, *The Johns Hopkins University, Aberdeen, MD, United States*, **Emilio Bachtiar**, **Azra Horowitz**, **Sung Kang**, *Johns Hopkins University, Baltimore, MD, United States*

#### 4:06pm Four Dimensional Printing of Smart Tissue Constructs

Technical Presentation. IMECE2018-86412

**Shida Miao**, **Haitao Cui**, *The George Washington University, Washington, DC, United States*, **Se Jun Lee**, *George Washington University, Washington, DC, United States*, **Xuan Zhou**, **Lijie Grace Zhang**, *The George Washington University, Washington, DC, United States*

#### 4:27pm A Pufferfish-Inspired Ingestible Hydrogel Machine

Technical Presentation. IMECE2018-88955

**Xinyue Liu**, **Shaoting Lin**, **Christoph Steiger**, **Xuanhe Zhao**, *MIT, Cambridge, MA, United States*

#### 4:46pm A Novel Microlaser Based Plasmonic-Polymer Hybrid Resonator

Technical Paper Publication. IMECE2018-86998

**Maurizio Manzo**, **Ryan Schwend**, *University of North Texas, Denton, TX, United States*

#### 5:09pm 3D Bioprinting of Thick Cardiac Constructs with Perfusable Vessels

Technical Presentation. IMECE2018-86261

**Lijie Grace Zhang**, **Haitao Cui**, *The George Washington University, Washington, DC, United States*, **Muhammad Mohiuddin**, *University of Maryland, Baltimore, MD, United States*

## 11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES

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### 11-8-3 Material Processing of Flexible Electronics, Sensors, and Devices III

**Room 330 3:45pm - 5:30pm**

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Session Chair: **Qiming Wang**, *University of Southern California, Los Angeles, CA, United States*

Session Co-Chair: **Yuris Dzenis**, *Univ Of Nebraska, Lincoln, NE, United States*

**3:45pm** Flexible beta-Ga<sub>2</sub>O<sub>3</sub> high power electronics  
Invited Presentation. IMECE2018-89204  
*Jung-Hun Seo, University at Buffalo, SUNY, Buffalo, NY, United States*

**4:27pm** Printed Electronics from Low-dimensional Nanomaterials - Toward Low-cost Transistors, Sensors, and Energy Devices  
Technical Presentation. IMECE2018-89991  
*Changyong Cao, Michigan State University, East Lansing, MI, United States*

**4:48pm** Stretchable Silver Nanowire Micro-conductors by Direct Inkjet Printing  
Technical Presentation. IMECE2018-89251  
*Qijin Huang, Karam N. Al-Milaji, Hong Zhao, Virginia Commonwealth University, Richmond, VA, United States*

**5:09pm** Tunable Electrical Properties of Embossed, Cellulose-based Paper  
Technical Presentation. IMECE2018-89695  
*Tongfen Liang, Xiyue Zou, Jiaqi Liu, Maame Assasie, Wei-Jian Guo, Chuyang Chen, Jingjin Xie, Max Tenorio, Rutgers University, Piscataway, NJ, United States, Assimina Pelegri, Rutgers University, East Brunswick, NJ, United States, Aaron Mazzeo, Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

## 11-9 MATERIALS PROCESSING AND CHARACTERIZATION

### 11-9-1 Materials Processing and Characterization I

**Room 329** 3:45pm - 5:30pm

Session Chair: **Sridhar Santhanam**, Villanova University, Collegeville, PA, United States  
Session Co-Chair: **Raghu Prakash**, Indian Institute of Technology Madras, Chennai, India

**3:45pm** Influence of Thermal Ratcheting on the Creep and Mechanical Properties of High Density Polyethylene (HDPE)  
Technical Paper Publication. IMECE2018-86043  
*Rahul Palaniappan Kanthabhabha Jeya, École de technologie supérieure, Montreal, QC, Canada, Abdel-Hakim Bouzid, Ecole Technologie Supérieure, Montreal, QC, Canada*

**4:06pm** Investigation of Process Parameters on Dry Sliding Wear of Self-Lubricating Metal Matrix Composites  
Technical Paper Publication. IMECE2018-86248  
*Senthil Kumar Velukkudi Santhanam, COLLEGE OF ENGINEERING, GUINDY, CHENNAI, OO, India, Dhanashekar Manickam, Karthikeyan S, Anna University, Chennai, Tamil Nadu, India*

**4:27pm** Effect of Micro (Banana) and Nano (SiC) Fillers on Mechanical Behaviors of Basalt/Epoxy Hybrid Composites

Technical Paper Publication. IMECE2018-86268  
*Senthil Kumar Velukkudi Santhanam, COLLEGE OF ENGINEERING, GUINDY, CHENNAI, OO, India, Bharani Srikanth P, Dept.of.Mechanical engineering,CEG,Anna University, Chennai, India, prakash sampath, Mohan Bangaru, Anna university, chennai, India*

**4:48pm** Localized Fatigue Response Evaluation of Weld Regions Through Cyclic Indentation Studies  
Technical Paper Publication. IMECE2018-86420  
*Raghu Prakash, Indian Institute of Technology Madras, Chennai, India, Krishna Madhavan, SASTRA University, Thanjavur, India, Anirudh Prakash, National Institute of Technology Tiruchirappalli, Tiruchirappalli, India, Pankaj Dhaka, Indian Institute of Technology Madras, Chennai, Tamilnadu, Tamilnadu, India*

**5:09pm** Investigations on the Structure and Properties of the Hot Extruded AA2014-Nano SiCp Composite  
Technical Paper Publication. IMECE2018-87237  
*Karibeeran Shanmuga Sundaram, Raja Manickam S, Ramaiyan Sankar, Anna University, Chennai, Tamilnadu, India, Dhanalakshmi Sathishkumar, CVRDE, Chennai, Tamilnadu, India*

## 11-15 MULTIFUNCTIONAL NANOMATERIALS

### 11-15-1 Multifunctional Nanomaterials 1

**Room 328** 3:45pm - 5:30pm

Session Chair: **Pei Dong**, George Mason University, Fairfax, VA, United States  
Session Co-Chair: **Wei Gao**, The University of Texas at San Antonio, San Antonio, TX, United States

**3:45pm** An Elastothermoviscoplasticity Anisotropic Damage Model for Short Fiber Reinforced Polymer Composites  
Technical Paper Publication. IMECE2018-86286  
*Ge He, Yucheng Liu, Mississippi State University, Mississippi State, MS, United States, Mark Horstemeyer, Mississippi State Univ, Starkville, MS, United States, Douglas J. Bammann, Mississippi State University, Mississippi State, MS, United States*

**4:06pm** Hybrid Nanomaterials and their Applications in Energy and Water Areas  
Technical Presentation. IMECE2018-86585  
*Pei Dong, George Mason University, Fairfax, VA, United States, Jun Lou, Rice Univ, Houston, TX, United States*

**4:27pm** Functionalized Cellulose Nanocrystals for Improving the Mechanical Properties of Poly(Lactic Acid)  
Technical Paper Publication. IMECE2018-87691  
*Jamileh Shojaeiarani, Dilpreet Bajwa, North Dakota State university, Fargo, ND, United States*

**4:48pm** Tailoring the property of nanocomposites using nickel coated carbon nanotube and magnetic field  
Technical Presentation. IMECE2018-89727  
*Ahmed M Abdalla, Rakesh Sahu, McMaster University, Hamilton, ON, Canada, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

Draft Program

**5:09pm** Phase Transition of monolayer MoTe<sub>2</sub>: The Role of Stress  
**Technical Presentation.** IMECE2018-87969  
*Wei Gao, University of Texas At San Antonio, San Antonio, TX, United States*

## TUESDAY, NOVEMBER, 13

### 11-23 PLENARY

#### 11-23-1 Materials: Genetics to Structures Plenary I

**Third Floor, David L. Lawrence Convention Center, Room 307 8:00am - 8:45am**

**8:00am** Biological Materials and Mechanics: Challenges and Opportunities  
**Plenary Presentation.** IMECE2018-90108  
*Marc Meyers, UC San Diego, La Jolla, CA, United States*

### 11-23 PLENARY

#### 11-23-2 Materials: Genetics to Structures Plenary II

**Third Floor, David L. Lawrence Convention Center, Room 307 9:00am - 9:45am**

**9:00am** The Future of Aerospace Materials: Challenges and Opportunities  
**Plenary Presentation.** IMECE2018-90109  
*Richard Vaia, Air Force Research Laboratory, Functional Materials Division, WPAFB, OH, United States*

### 11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES

#### 11-8-4 Material Processing of Flexible Electronics, Sensors, and Devices IV

**Third Floor, David L. Lawrence Convention Center, Room 333 10:00am - 11:45am**

Session Chair: *Yuris Dzenis, Univ Of Nebraska, Lincoln, NE, United States*  
Session Co-Chair: *Woon-Hong Yeo, Georgia Institute of Technology, Atlanta, GA, United States*

**10:00am** Large-Scale Hybrid Monolithic Nanomanufacturing of Liquid-Solid Heterojunction Devices for Self-Powered Smart Skin  
**Invited Presentation.** IMECE2018-89581  
*Wenzhuo Wu, Purdue University, West Lafayette, IN, United States*

**10:42am** EGain?Metal Interfacing for Microelectronics Integration in Liquid Metal-based Stretchable Electronics  
**Technical Presentation.** IMECE2018-89634  
*Kadri Bugra Ozutemiz, James Wissman, O. Burak Ozdoganlar, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States*

**11:03am** Molecular configuration of solution-processed interfaces between inorganic-organic hybrid perovskite and electron transport layer  
**Technical Presentation.** IMECE2018-88120  
*MFN Taufique, Washington State University, Pullman, WA, United States, Samrat Choudhury, University of Idaho, Moscow, ID, United States, Soumik Banerjee, Washington State University, Pullman, WA, United States*

**11:24am** Additive Manufacturing of Polymer Nanocomposites With In-Situ Strain Sensing Capability  
**Technical Paper Publication.** IMECE2018-86263  
*Mohammad Abshirini, Mohammad Charara, Yingtao Liu, Mrinal Saha, University of Oklahoma, Norman, OK, United States, M. Cengiz Altan, Univ Of Oklahoma, Norman, OK, United States*

### 11-9 MATERIALS PROCESSING AND CHARACTERIZATION

#### 11-9-2 Materials Processing and Characterization II

**Room 331 10:00am - 11:45am**

Session Chair: *Patrick Brewick, US Naval Research Laboratory, Washington, DC, United States*  
Session Co-Chair: *Zahabul Islam, The Pennsylvania State University, State College, PA, United States*

**10:00am** Low Temperature Annealing of Metals with Electrical Wind Force Effects  
**Technical Presentation.** IMECE2018-86350  
*Daudi Waryoba, Penn State University, DuBois, PA, United States, Zahabul Islam, Baoming Wang, The Pennsylvania State University, State College, PA, United States, Md Haque, Penn State University, University Park, PA, United States*

**10:21am** Influence of Ca-Ba and Sr Base Inoculants on Metallurgical and Mechanical Properties of Grey and Ductile Cast Irons  
**Technical Paper Publication.** IMECE2018-86448  
*Dhruv Patel, Aditya Silver Oak Institute of Technology, ahmedabad, India, Devendra Parmar, Silver Oak college of engineering and technology, Rajkot, India, Siddharthsinh Jadeja, Aditya Silver Oak Institute of Technology, Rajkot Gujarat, India*

**10:42am** Modeling the Influence of Microstructure on Stress Distributions and Concentrations in Pitting Corrosion  
**Technical Paper Publication.** IMECE2018-86465  
*Patrick Brewick, US Naval Research Laboratory, Washington, DC, United States, Andrew Geltmacher, Naval Research Laboratory, Washington, DC, United States, Siddiq Qidwai, National Science Foundation, Arlington, VA, United States*

**11:03am**                    **Hardness Improvement of Binderless Boron Nitride Composites Through Hybrid CO<sub>2</sub> Laser? Waterjet Heat Treatment**

**Technical Presentation.** IMECE2018-86740

**Jingnan Zhao**, Tianjin University of Science and Technology, Tianjin, China, **Pranav Shrotriya**, Iowa State University, Ames, IA, United States, **Jian Guo**, **Xiaolei Ma**, Tianjin University of Science and Technology, Tianjin, China

**11:24am**                    **Fatigue Crack Growth Rate Studies on Stainless Steel Welds**

**Technical Paper Publication.** IMECE2018-86915

**Manuel Thomas**, **Raghu Prakash**, **Ganesh Sundararaman**, Indian Institute of Technology Madras, Chennai, Tamilnadu, India, **Vasudevan Muthukumar**, Indira Gandhi Centre for Atomic Research, Kalpakkam, Tamilnadu, India

## **11-12 MECHANICS IN MANUFACTURING OF MULTIFUNCTIONAL MATERIALS AND STRUCTURES**

**11-12-1 Mechanics in Manufacturing of Multifunctional Materials and Structures I**

**Third Floor, David L. Lawrence Convention Center, Room 334    10:00am - 11:45am**

Session Chair: **Baoxing Xu**, University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States  
Session Co-Chair: **Weiyl Lu**, Michigan State University, East Lansing, MI, United States

**10:00am**                    **Material Interactions and Self-Assembly through a Dual-drop Jet Inlet Printing Process**

**Invited Presentation.** IMECE2018-88766

**Hong Zhao**, Virginia Commonwealth University, Richmond, VA, United States

**10:21am**                    **Structurally Robust Thermal Insulating Coating for Improving Building Energy Efficiency**

**Technical Presentation.** IMECE2018-86599

**Rui Kou**, **Ying Zhong**, UC, San Diego, La Jolla, CA, United States, **Meng Wang**, University of California, San Diego, La Jolla, CA, United States, **Yu Qiao**, Univ Of California San Diego, La Jolla, CA, United States

**10:42am**                    **Scale-up Processing and Testing of Multifunctional Current Collector in Large Format Lithium-ion Battery Pouch Cells**

**Technical Presentation.** IMECE2018-86107

**Meng Wang**, University of California, San Diego, La Jolla, CA, United States, **Yu Qiao**, Univ Of California San Diego, La Jolla, CA, United States

**11:03am**                    **Strain Engineering of 2D Materials: the Essential Role of Interface**

**Technical Presentation.** IMECE2018-89079

**Zhaoho Dai**, University of Texas at Austin, Austin, TX, United States

**11:24am**                    **Liquid Evaporation-Driven Self-folding of Free-standing Graphene**

**Technical Presentation.** IMECE2018-89109

**Qingchang Liu**, University of Virginia, Charlottesville, VA, United States

## **11-14 MULTIFUNCTIONAL COMPOSITE MATERIALS AND STRUCTURES**

**11-14-4 Multifunctional Composite Materials and Structures 4**

**Room 407    10:00am - 11:45am**

Session Chair: **Jun Xu**, Beihang University, Beijing, China

Session Co-Chair: **Sha Yin**, Beihang University, Beijing, China

**10:00am**                    **Effect of nail penetration rate on short circuit and thermal runaway behavior of lithium-ion battery**

**Technical Presentation.** IMECE2018-87453

**Zhiguo Hong**, **Sha Yin**, **Jun Xu**, Beihang University, Beijing, China

**10:21am**                    **A detailed mechanical model of 18650 lithium-ion battery**

**Technical Presentation.** IMECE2018-89127

**Lubing Wang**, **Jun Xu**, **Jia Yikai**, Beihang University, Beijing, China

**10:42am**                    **Fabrication and properties characterization of porous structure electrolyte**

**Technical Presentation.** IMECE2018-89945

**Ziran Hu**, **Sha Yin**, **Huitian Wang**, **Haoyu Chen**, Beihang University, Beijing, Beijing, China

**11:03am**                    **Flatwise Mechanical Behaviour and Energy Absorption of Tube Integrated Honeycombs**

**Technical Presentation.** IMECE2018-89942

**Yaobo Wu**, **Haoyu Chen**, **Huitian Wang**, **Sha Yin**, Beihang University, Beijing, China

**11:24am**                    **Damping Characterization of Hierarchical Composites**

**Technical Presentation.** IMECE2018-89641

**Suma Ayyagari**, **Marwan Al-Haik**, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States

## **11-9 MATERIALS PROCESSING AND CHARACTERIZATION**

**11-9-3 Materials Processing and Characterization III**

**Room 331    1:45pm - 3:30pm**

Session Chair: **Mauricio Cornejo**, Escuela Superior Politecnica del Litoral, Guayaquil, Ecuador

Session Co-Chair: **Frank J. Shih**, Seattle Univ, Seattle, WA, United States

**Draft Program**

**1:45pm Anti-Corrosive Coating Using Recycled High Density Polyethylene for Automotive Chassis**

Technical Paper Publication. IMECE2018-86498

*Joshua Bachert, Penn State University - Harrisburg, Middletown, PA, United States, AHM RAHMAN, Pennsylvania State University - Harrisburg, Middletown, PA, United States, Ma'moun Abu-Ayyad, Penn State Harrisburg, Middletown, PA, United States*

**2:06pm A Study on the Corrosion and Mechanical Properties of an Al6063 Reinforced With Egg Shell Ash and Rice Husk Ash**

Technical Paper Publication. IMECE2018-86662

*Nosa Idusuyi, University of Ibadan, Ibandan, Oyo, Nigeria, Peter Oviroh, University of Johannesburg, Johannesburg, Select State/Province, South Africa, Adetoye Henry Adekoya, University of Ibadan, Ibandan, Oyo, Nigeria*

**2:27pm Assessment of Induced Delamination During End-Milling of Natural Fiber Reinforced Composites: A Statistical Analysis**

Technical Paper Publication. IMECE2018-86978

*Khalid Alzebdeh, Sultan Qaboos University, Al-Khod, Oman, Mahmoud Nassar, Nasr Al-Hinai, Sultan Qaboos University, Al-Khod, Oman*

**2:48pm Effect of Calcium Hydroxide and Water to Solid Ratio on Compressive Strength of Mordenite-Based Geopolymer and the Evaluation of its Thermal Transmission Property**

Technical Paper Publication. IMECE2018-87625

*Mauricio Cornejo, Bolivar Togra, Haci Baykara, Escuela Superior Politecnica del Litoral, Guayaquil, Ecuador, Guillermo F. Soriano, ESPOL Polytechnic University, Guayaquil, Guayas, Ecuador, Cecilia Paredes, Escuela Superior Politecnica del Litoral, Guayaquil, Guayas, Ecuador, Jan Ellen, Katholieke Universiteit Leuven, Leuven, Belgium*

**3:09pm Recycling of thermoplastic waste in the industry**

Technical Presentation. IMECE2018-87979

*Sadek Salem Cherif, University of Sciences and Technology of Oran Mohamed Boudiaf, Tizi-Ouzou, OO, Algeria*

**11-10 BIOINSPIRED MATERIALS, STRUCTURES AND APPLICATIONS**

**11-10-1 Bioinspired Composites and Structures**

**Third Floor, David L. Lawrence Convention Center, Room 333 1:45pm - 3:30pm**

Session Chair: **Seyed Allameh**, Northern Kentucky University, Highland Heights, KY, United States

Session Co-Chair: **Zhenhai Xia**, University of North Texas, Denton, TX, United States

**1:45pm Mechanical Properties of 3D Printed Biomimicked Composites**

Technical Paper Publication. IMECE2018-86309

*Seyed Allameh, Northern Kentucky Univ, Newport, KY, United States, Roger Miller, Hadi Allameh, Northern Kentucky University, Highland Heights, KY, United States*

**2:06pm Bioinspired materials for water vapor harvesting**

Technical Presentation. IMECE2018-86828

*Yiyang Wan, University of North Texas, Denton, TX, United States, Yong Gao, Northwestern Polytechnical University, Xi'an, Shannxi, China, Zhenhai Xia, University of North Texas, Denton, TX, United States*

**2:27pm Magnetically actuated dynamic iridescence inspired by the neon tetra**

Technical Presentation. IMECE2018-87100

*Zhiren Luo, North Carolina State University, Raleigh, NC, United States, Benjamin Evans, Elon University, Elon, NC, United States, Chih-Hao Chang, North Carolina State University, Raleigh, NC, United States*

**2:48pm Enhancing Light Transmission in Nacre-Inspired Multilayer Composites using Interfacial Nanostructures**

Technical Presentation. IMECE2018-87506

*Yi-An Chen, Chih-Hao Chang, North Carolina State University, Raleigh, NC, United States, Sharan/ S.V. Naidu, GlobalFoundries, Raleigh, NC, United States, Zhiren Luo, North Carolina State University, Raleigh, NC, United States*

**11-12 MECHANICS IN MANUFACTURING OF MULTIFUNCTIONAL MATERIALS AND STRUCTURES**

**11-12-2 Mechanics in Manufacturing of Multifunctional Materials and Structures II**

**Third Floor, David L. Lawrence Convention Center, Room 333 1:45pm - 3:30pm**

Session Chair: **Weiye Lu**, Michigan State University, East Lansing, MI, United States

Session Co-Chair: **Baoxing Xu**, University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States

**1:45pm Micro- and Macro- Modeling and Applications of Soft Magneto-Active Elastomers**

Invited Presentation. IMECE2018-89993

*Yin Liu, Changyong Cao, Michigan State University, East Lansing, MI, United States*

**2:06pm Adhesion tuning through embedded pneumatic channels**

Technical Presentation. IMECE2018-89897

*Aoyi Luo, University of Pennsylvania, Philadelphia, PA, United States, Amir M. Nasab, University of Nevada, Reno, Reno, NV, United States, Wanliang Shan, University of Nevada Reno, Reno, NV, United States, Kevin Turner, University of Pennsylvania, Philadelphia, PA, United States*

**2:27pm Mechanics of Liquid-Assisted Mechanical Peeling of 2D Materials**

Technical Presentation. IMECE2018-89108

*Yue Zhang, University of Virginia, Charlottesville, VA, United States*

**2:48pm**      **Perturbation Analysis of Surface Amorphous Layer Formation.**

**Technical Presentation.** IMECE2018-88854

*Rahul Basu, VTU, Bangalore, Ka, India*

**3:09pm**      **Analytical Investigation of the Stiffness of Homogenous Isotropic Mechanical Materials With Different Cross Sections**

**Technical Paper Publication.** IMECE2018-86197

*Michael Agarana, Covenant University., Ota, Ogun State, Nigeria, Esther Akinlabi, University of Johannesburg, JOHANNESBURG, GAUTENG PROVINCE, South Africa*

## **11-15 MULTIFUNCTIONAL NANOMATERIALS**

### **11-15-2 Multifunctional Nanomaterials 2**

**Room 407**      **1:45pm - 3:30pm**

Session Chair: **Wei Gao**, *The University of Texas at San Antonio, San Antonio, TX, United States*

**1:45pm**      **Application of Cellulose Nanocrystals and Zinc Oxide as Green Fire Retardant in High Density Polyethylene**

**Technical Presentation.** IMECE2018-88214

*Ghazal Vahidi, Dilpreet Bajwa, Jamileh Shojaeiarani, North Dakota State University, Fargo, ND, United States*

**2:06pm**      **Investigating Effects of Graphene Nano Inclusions for Improved Desalination Rates of Salt Water Under Solar Heat**

**Technical Paper Publication.** IMECE2018-88137

*Vinay Patil, Aybala Usta, Muhammad Rahnai, Ramazan Asmatulu, Wichita State University, Wichita, KS, United States*

**2:27pm**      **One-step Flame Synthesis of W/Moly/N Doped Titanium Dioxide Nanoparticles with Enhanced Photocatalytic Activity**

**Technical Presentation.** IMECE2018-89617

*Yuqian Zhang, Zhizhong Dong, Gang Xiong, Stephen Tse, Bernard Kear, Rutgers University, Piscataway, NJ, United States*

**2:48pm**      **Designing Stiffness-Switching Thermoplastic Nanocomposites for Wearable and Robotic Applications**

**Technical Presentation.** IMECE2018-89671

*Steven Rich, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States*

## **11-8 MATERIAL PROCESSING OF FLEXIBLE ELECTRONICS, SENSORS, AND DEVICES**

### **11-8-5 Material Processing of Flexible Electronics, Sensors, and Devices V**

**Third Floor, David L. Lawrence Convention Center, Room 304**      **3:45pm - 5:30pm**

Session Chair: **Woon-Hong Yeo**, *Georgia Institute of Technology, Atlanta, GA, United States*

Session Co-Chair: **Aaron Mazzeo**, *Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

**3:45pm**      **A Highly Scalable Additive Printing Process for High-Performance and Flexible Thermoelectric Materials and Devices**

**Technical Presentation.** IMECE2018-87747

*Yanliang Zhang, University of Notre Dame, Notre Dame,, IN, United States, Tony Varghese, Boise State University, Boise, ID, United States, Mortaza Saeidi-Javash, University of Notre Dame, Notre Dame,, IN, United States*

**4:06pm**      **Processing of Surface Modified Barium Titanate Flexible Nanocomposite Films**

**Technical Presentation.** IMECE2018-90025

*Kimberly Cook-Chennault, Rutgers University, Piscataway, NJ, United States*

**4:27pm**      **Piezoelectric Polymer Thin Films with Architected Cuts for Enhancing Flexibility and Ambient Wind Energy Harvesting**

**Technical Presentation.** IMECE2018-89034

*Lichen Fang, Jing Li, Zeyu Zhu, Sung Kang, Johns Hopkins University, Baltimore, MD, United States*

**4:48pm**      **An Integrated Wearable Device based on Silver Nanowire Nanocomposites**

**Technical Presentation.** IMECE2018-89918

*Shanshan Yao, Bryan Vogel, Yong Zhu, North Carolina State University, Raleigh, NC, United States*

## **11-9 MATERIALS PROCESSING AND CHARACTERIZATION**

### **11-9-1 Materials Processing and Characterization IV**

**Room 331**      **3:45pm - 5:30pm**

Session Chair: **Delfim Soares**, *University of Minho, Guimaraes, Select State/Province, Portugal*

Session Co-Chair: **Raghu Prakash**, *Indian Institute of Technology Madras, Chennai, India*

**3:45pm**      **Experimental Investigating the Impact of Ionic Liquid on PET's Properties**

**Technical Paper Publication.** IMECE2018-86854

*Waleed Ahmed, United Arab Emirates University, Al Ain, United Arab Emir.*

**4:06pm**      **Exploring the Use of Cinnamate Derivatives for Bulk-Mediated Photo-Alignment of Liquid Crystal Elastomers**

**Technical Presentation.** IMECE2018-87111

*Matthew L. Smith, Brian D. Simonich, Erik Johnsen, Alyssa VanZanten, Hope College, Holland, MI, United States*

**4:27pm**      **Effect of Constrained Groove Pressing on Mechanical Properties of Nitinol Alloy**

**Technical Paper Publication.** IMECE2018-87295

*Shanthan Kumar Padisala, BITS Pilani Hyderabad Campus, Hyderabad, India, Akhil Bhardwaj, BITS Pilani- Hyderabad Campus, Hyderabad, Telangana, India, Kamal Poluri, Amit Kumar Gupta, BITS Pilani hyderabad campus, hyderabad, India*

**4:48pm Influence of the Microstructure on the Creep Behaviour of Tin-Silver-Copper Solder**

Technical Paper Publication. IMECE2018-87789

*Pedro Ribeiro, University of Minho, Guimarães, Portugal, Delfim Soares, University of Minho, Guimaraes, Select State/Province, Portugal, Maria Cerqueira, Physics Department, Braga, Portugal, Senhorinha Teixeira, University of Minho, Guimaraes, Select State/Province, Portugal, Daniel Barros, University of Minho, Guimarães, Portugal, Jose Teixeira, University of Minho, Guimaraes, Portugal, Pauline Capela, University of Minho, Guimarães, Portugal, Francisco Macedo, University of Minho, Braga, Portugal*

**5:09pm A Three-Dimensional Nested Reinforcing Mesh in Elastomers for Crashworthy Applications**

Technical Paper Publication. IMECE2018-88471

*David J., Traina, Thomas C., Ekstrom, Owen F., Van Valkenburgh, Jean-Paul R., Wallis, David S., Schulman, Emily R., Mather, Nathan K., Yasuda, Seattle University, Seattle, WA, United States, Frank J. Shih, Seattle Univ, Seattle, WA, United States*

**11-10 BIOINSPIRED MATERIALS, STRUCTURES AND APPLICATIONS**

**11-10-2 Bioinspired Materials, Structures and Applications**

**Third Floor, David L. Lawrence Convention Center, Room 333 3:45pm - 5:30pm**

Session Chair: *Zhenhai Xia, University of North Texas, Denton TX, United States*

Session Co-Chair: *Seyed Allameh, Northern Kentucky Univ, Newport, KY, United States*

**3:45pm Fiber reorientation behavior of functional graded Bouligand architectures**

Technical Presentation. IMECE2018-88222

*Di Wang, Purdue University, West Lafayette, IN, United States, Alireza Zaheri, Northwestern University, Evanston, IL, United States, Benjamin Russell, University of Cambridge, Cambridge, United Kingdom, Horacio Espinosa, Northwestern University, Evanston, IL, United States, Pablo Zavattieri, Purdue University, West Lafayette, IN, United States*

**4:06pm Bioinspired Microstructures and Guided Crack Propagation in Photopatterned Dual-Cure Polymer Networks**

Technical Presentation. IMECE2018-89354

*Lewis Cox, NIST, Boulder, CO, United States, Adrienne Blevins, University of Colorado Boulder, Boulder, CO, United States, Yifu Ding, University of Colorado, Boulder, CO, United States, Jasper Drisko, Jason Killgore, NIST, Boulder, CO, United States*

**4:27pm Tunable thermal transport and reversible thermal conductivity switching in topologically networked bio-inspired materials**

Technical Presentation. IMECE2018-89795

*John A. Tomko, University of Virginia, Charlottesville, VA, United States, Abdon Pena-Francesch, Huihun Jung, Pennsylvania State University, State College, PA, United States, Madhusudan Tyagi, National Institute of Standards, Gaithersburg, MD, United States, Benjamin Allen, Pennsylvania State University, State College, PA, United States, Melik Demirel, Penn State Univ, University Park, PA, United States, Patrick E. Hopkins, University of Virginia, Charlottesville, VA, United States*

**4:48pm Seedcoat-Inspired Architected Materials with Sutural Tessellation**

Technical Presentation. IMECE2018-90038

*Yaning Li, Chao Gao, Benjamin Hasseldine, University of New Hampshire, Durham, NH, United States, Ling Li, University of Virginia, Blacksburg, VA, United States, James Weaver, Harvard University, Cambridge, MA, United States*

**5:09pm Experimental analysis and characterization of bioplastic materials reinforced with nanofibers and nanoparticles**

Technical Presentation. IMECE2018-88857

*Mohammad Asaduzzaman Chowdhury, Dhaka University of Engrg & Tech, Gazipur, Gazipur, Bangladesh, Bengir Ahmed Shuvo, Dhaka University of Engineering & Technology, Dhaka, Bangladesh, Rajib Nandee, Uttam Kumar Debnath, Dhaka University of Engineering and Technology, Gazipur, Gazipur, Bangladesh, Mohi Uddin Ahmed, Dhaka University of Engineering & Technology, Gazipur, Bangladesh, Suman Das, University of Saskatchewan, Saskatchewan, SK, Canada, Md. Fuhulmi, Dhaka University of Engineering & Technology, Gazipur, Bangladesh*

**11-14 MULTIFUNCTIONAL COMPOSITE MATERIALS AND STRUCTURES**

**11-14-1 Multifunctional Composite Materials and Structures 1**

**Third Floor, David L. Lawrence Convention Center, Room 334 3:45pm - 5:30pm**

Session Chair: *Jun Xu, Beihang University, Beijing, China*

Session Co-Chair: *Sha Yin, Beihang University, Beijing, China*

**3:45pm Stochastic Modeling of a High Speed Composite Flywheel for Energy Storage**

Technical Paper Publication. IMECE2018-86484

*Matthew Riley, Rose-Hulman Institute of Technology, Terre Haute, IN, United States, Justin Pettingill, University of Idaho, Moscow, ID, United States*

**4:06pm Determination of Key Influencing Factors on Thermal Conductivity Enhancement of Graphene Nano-Platelets Reinforced Epoxy**

Technical Paper Publication. IMECE2018-86847

*Maximilian Rieger, Balakrishnan Nagarajan, University of Alberta, Edmonton, AB, Canada, Mario Vollmer, Technical University of Munich, Garching, Select State/Province, Germany, Pierre Mertiny, University of Alberta, Edmonton, AB, Canada*

**4:27pm**            **A Finite Element Study Of The Impact Of Interphase On The Damping Properties Of Polymer Composites**  
Technical Presentation. IMECE2018-88066

**Satyam Shukla, Shank S. Kulkarni**, University of North Carolina at Charlotte, Charlotte, NC, United States, **Alireza Tabarraei**, University of North Carolina Charlotte, Charlotte, NC, United States

**4:48pm**            **Prediction of Gas Permeation in Polymeric Materials Used in Oil and Gas Industry**

Technical Paper Publication. IMECE2018-87211

**Nooshin Nassr**, University of Oklahoma, Hackensack, NJ, United States, **Zahed Siddique**, Univ Of Oklahoma, Norman, OK, United States

**5:09pm**            **Numerical Analysis About Hierarchical Lattice Materials With Different Constructions**

Technical Presentation. IMECE2018-89155

**Haoyu Chen, Sha Yin**, Beihang University, Beijing, China, **Xiang Gao**, Beihang University(BUAA), Beijing, China

## WEDNESDAY, NOVEMBER, 14

### 11-9 MATERIALS PROCESSING AND CHARACTERIZATION

#### 11-9-5 Materials Processing and Characterization V

Third Floor, David L. Lawrence Convention Center, Room 334    **10:00am - 11:45am**

Session Chair: **Muhammad Kamran**, Wichita State University, Wichita, KS, United States

Session Co-Chair: **Philippe Geubelle**, University of Illinois, Urbana, IL, United States

**10:00am**            **Advanced Recycled Materials for Economic Production of Fire Resistant Fabrics**

Technical Paper Publication. IMECE2018-88640

**Tamseel Ahmed, Zaara Ali, Muhammad Rahman, Eylem Asmatulu**, Wichita State University, Wichita, KS, United States

**10:21am**            **Processing and Characterization of filler Silicon Carbide , Aluminum Oxide and Titanium Oxide Particles on Glass Fiber Hybrid Composite**

Technical Presentation. IMECE2018-88852

**Mohammad Asaduzzaman Chowdhury**, Dhaka University of Engrg & Tech, Gazipur, Gazipur, Bangladesh, **Uttam Kumar Debnath, Benjir Ahmed Shuvho, Rajib Nandee**, Dhaka University of Engineering and Technology, Gazipur, Gazipur, Bangladesh, **Suman Das**, University of Saskatchewan, Saskatchewan, SK, Canada, **Atiqur Rahman**, Bangladesh Road Transport Authority (BRTA), Dhaka, Bangladesh

**10:42am**            **Faster, Energy-Efficient Manufacturing of Fiber-Reinforced Composites Using Frontal Polymerization**

Technical Presentation. IMECE2018-88994

**Philippe Geubelle, Elyas Goli, Sagar Vyas**, University of Illinois, Urbana, IL, United States

**11:03am**            **Trade-off between Boron Doping and Stiffness, Strength and Damage Tolerance of Graphene**  
Technical Presentation. IMECE2018-89089

**Zhaohe Dai**, University of Texas at Austin, Austin, TX, United States

**11:24am**            **In-situ characterization of residual stress and primary creep in NiW thin films using wafer curvature**

Technical Presentation. IMECE2018-89821

**Prince Singh, Ryan Pocratsky, Maarten P. De Boer**, Carnegie Mellon University, Pittsburgh, PA, United States

### 11-14 MULTIFUNCTIONAL COMPOSITE MATERIALS AND STRUCTURES

#### 11-14-2 Multifunctional Composite Materials and Structures 2

Third Floor, David L. Lawrence Convention Center, Room 335    **10:00am - 11:45am**

Session Chair: **Akio Yonezu**, Chuo University, Tokyo, Japan

Session Co-Chair: **Jun Xu**, Beihang University, Beijing, China

**10:00am**            **Effect of Porous Structure on Tensile Deformation of Porous Polymer Membranes: FEM Computations of Periodic and Random Pore Structures**

Technical Presentation. IMECE2018-86656

**Kanako Emori, Yoshiki Nishiyama, Takumi Nagakura, Akio Yonezu**, Chuo University, Tokyo, Japan

**10:21am**            **Deformation Modeling of Porous Polymer Materials with 3D Random Pore Structure**

Technical Presentation. IMECE2018-86492

**Hiroshi Kishida**, Chuo University, Tokyo, Japan, **Shugo Fushimi**, Chuo University, Tokyo, Japan, **Takumi Nagakura, Kanako Emori, Akio Yonezu**, Chuo University, Tokyo, Japan

**10:42am**            **Anisotropic Deformation Behavior of Polymeric Microfiltration Membranes: Experiment and FEM modeling**

Technical Presentation. IMECE2018-86655

**Takumi Nagakura, Kanako Emori, Hiroshi Kishida, Akio Yonezu**, Chuo University, Tokyo, Japan

**11:03am**            **Bonding Strength Evaluation of Al alloy and Epoxy Resin by Using Laser induced Ultrasonic Wave**

Technical Presentation. IMECE2018-86658

**Yusaku Saito, Takeshi Yamada, Akio Yonezu**, Chuo university, Tokyo, Japan

**11:24am**            **Nano Surface Adhesion and Deformation Behaviors of Polymer Blend Membranes for Water Purification by Using Atomic Force Microscopy**

Technical Presentation. IMECE2018-87302

**Kazunori Miyamoto, Daiki Ikeshima**, Chuo University, Tokyo, Japan, **Kenji Furuya, Hiroshi Yamamura**, Chuo University, Tokyo, Japan, **Akio Yonezu**, Chuo University, Tokyo, Japan

## 11-18 PHASE TRANSFORMATIONS IN MATERIALS PROCESSING

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### 11-18-1 Phase Transformations in Materials Processing I: Additive Manufacturing

Third Floor, David L. Lawrence Convention Center, Room 336 10:00am - 11:45am

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Session Chair: **Mohsen Asle Zaeem**, *Colorado School of Mines, Golden, CO, United States*

**10:00am** Additive Manufacturing, 3D Printing, Porosity and Synchrotron Experiments  
Invited Presentation. IMECE2018-86665  
*Anthony Rollett, Carnegie Mellon Univ., Pittsburgh, PA, United States*

**10:21am** An Overview of Additive Manufacturing of Functional Magnetic Shape Memory Alloys and Metamagnetic Materials with Magnetocaloric Properties  
Invited Presentation. IMECE2018-88140  
*Markus Chmielus, Jakub Toman, Amir Mostafaei, Erica Stevens, Katerina A. Kimes, University of Pittsburgh, Pittsburgh, PA, United States*

**10:42am** Optimizing Additively-Manufactured Inconel 625 for Reliable Mechanical Properties and Corrosion Resistance  
Invited Presentation. IMECE2018-88848  
*Mark Stoudt, National Institute of Standards & Technology, Gaithersburg, MD, MD, United States, Richard Tucker, Erica Lass, NIST, Gaithersburg, MD, MD, United States*

**11:03am** Nano-scale spatiotemporal resolution transmission electron microscopy of multicomponent alloy microstructure evolution during rapid thermal transients  
Invited Presentation. IMECE2018-86718  
*Jorg Wiezorek, University of Pittsburgh, Pittsburgh, PA, United States, Joseph McKeown, Lawrence Livermore National Laboratory, Livermore, CA, United States, Vishwanadh Bathula, University of Pittsburgh, Pittsburgh, PA, United States*

**11:24am** Binder Jet 3D Printing of Metamagnetic Ni-Mn-based Alloys for Magnetocaloric Applications  
Technical Presentation. IMECE2018-88204  
*Erica Stevens, Katerina A. Kimes, Aaron Acierno, Rafael Rodriguez, Amir Mostafaei, Markus Chmielus, University of Pittsburgh, Pittsburgh, PA, United States*

## 11-9 MATERIALS PROCESSING AND CHARACTERIZATION

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### 11-9-6 Materials Processing and Characterization VI

Third Floor, David L. Lawrence Convention Center, Room 334 1:45pm - 3:30pm

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Session Chair: **Raghu Prakash**, *Indian Institute of Technology Madras, Chennai, India*  
Session Co-Chair: **Nicholas J. Morris**, *UES, Inc./AFRL, Dayton, OH, United States*

**1:45pm** PH level of Pore Solution in Alkali Activated Fly-Ash Geopolymer Concrete and Its Effect on ASR of Aggregates with Wide Silicate Contents  
Technical Presentation. IMECE2018-89053  
*Shree Paudel, Mijia Yang, North Dakota State University, Fargo, ND, United States*

**2:06pm** Influence of Steel Fiber on Mechanical Properties of Elevated Temperature Cured Fly-ash based Geopolymer Mortar  
Technical Presentation. IMECE2018-89054  
*Shree Paudel, Mijia Yang, North Dakota State University, Fargo, ND, United States*

**2:27pm** Correlating Chemistry and Mechanics to Design Liquid Metal Nanoparticles for Self-Healing Electronics  
Technical Presentation. IMECE2018-89549  
*Nicholas J. Morris, Zachary J. Farrell, UES, Inc./AFRL, Dayton, OH, United States, Christopher E. Tabor, Air Force Research Laboratory, WPAFB, OH, United States*

**2:48pm** Scalable Manufacturing Routes to Develop Boron Nitride Nanotubes Based Metal Matrix Composites  
Technical Presentation. IMECE2018-89722  
*Pranjali Nautiyal, Benjamin Boesl, Arvind Agarwal, Florida International University, Miami, FL, United States*

**3:09pm** Assessing Interlayer Adhesion Degradation in Photovoltaic Backsheets Using the Single Cantilever Beam Test  
Technical Presentation. IMECE2018-89668  
*Scott Julien, Northeastern University, Boston, MA, United States, Xiaohong Gu, Jianjun Ren, National Institute of Standards and Technology, Gaithersburg, MD, United States, Kai Tak Wan, Northeastern University, Boston, MA, United States*

## 11-14 MULTIFUNCTIONAL COMPOSITE MATERIALS AND STRUCTURES

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### 11-14-3 Multifunctional Composite Materials and Structures 3

Third Floor, David L. Lawrence Convention Center, Room 335 1:45pm - 3:30pm

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Session Chair: **Sha Yin**, *Beihang University, Beijing, China*  
Session Co-Chair: **Akio Yonezu**, *Chuo University, Tokyo, Japan*

**1:45pm** Thermal Resistance of Polystyrene-Seeded Concrete for Better Insulative Value  
Technical Paper Publication. IMECE2018-88661  
*Chris Kobus, Oakland Univ, Rochester, MI, United States, Michael Huyssen, Ryan Piper, J. David Schall, Oakland University, Rochester, MI, United States, Laila Guessous, Oakland University, Bloomfield, MI, United States, Xia Wang, Oakland Univ, Rochester, MI, United States*

**2:06pm** Ordered Carbon Nanotube-Polymer Composites from Lyotropic Liquid Crystal Templating  
Technical Presentation. IMECE2018-89476  
*Shanju Zhang, Cal Poly, San Luis Obispo, CA, United States*

**2:27pm Mechanical and Morphological Properties of Nickel-plated Luffa Sponge**

Technical Presentation. IMECE2018-89946

*Huitian Wang, Haoyu Chen, Zihan Hu, Yaobo Wu, Sha Yin, Beihang University, Beijing, China*

**2:48pm Investigating The Mechanical Behaviour of Al6063 Stir Cast With Coconut Husk**

Technical Presentation. IMECE2018-88953

*PATRICK ADEBISI OLUSEGUN ADEGBUYI, LAGOS STATE UNIVERSITY, LAGOS, LAGOS, Nigeria*

**3:09pm Micromechanical Modeling of Nonlinear Responses of Active Woven Composites**

Technical Presentation. IMECE2018-88354

*Wen-chen Lin, Chien-hong Lin, National Cheng Kung University, Tainan, Select State/Province, Taiwan*

## **11-18 PHASE TRANSFORMATIONS IN MATERIALS PROCESSING**

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**11-18-2 Phase Transformations in Materials Processing II: Microstructures and Properties**

**Third Floor, David L. Lawrence Convention Center, Room 336 1:45pm - 3:30pm**

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Session Chair: **Mohsen Asle Zaeem**, Colorado School of Mines, Golden, CO, United States

Session Co-Chair: **Siddhartha Pathak**, University of Nevada, Reno, Reno, NV, United States

**1:45pm New Insights into Metallic Alloy Microstructural Evolution by In-situ Characterization**

Invited Presentation. IMECE2018-88880

*Amy Clarke, Colorado School of Mines, Golden, CO, United States*

**2:06pm Structure and Properties of bcc Mg Synthesized Using Interface Strain Engineering**

Invited Presentation. IMECE2018-88968

*Siddhartha Pathak, University of Nevada, Reno, Reno, NV, United States, Manish Jain, University of Nevada Reno, Reno, NV, United States, Marko Knezevic, University of New Hampshire, Durham, NH, United States, Nenad Velisavljevic, Los Alamos National Laboratory, LOS ALAMOS, NM, United States, Nathan Mara, University of Minnesota, Minneapolis, MN, United States, Irene Beyerlein, University of California, Santa Barbara, Santa Barbara, CA, United States*

**2:27pm Understanding nucleation phenomena and phase formation in rapid solidification of Al and Al-Cu alloys**

Technical Presentation. IMECE2018-88934

*Avik Mahata, Missouri S&T, Rolla, MO, United States, Michael Baskes, University of California, San Diego, La Jolla, CA, United States, Mohsen Asle Zaeem, Colorado School of Mines, Golden, CO, United States*

**2:48pm Effect of Non-equilibrium Cooling on Phase Transformations and Morphology of Second Phases in Al-rich Al-Cu Alloys**

Technical Presentation. IMECE2018-87574

*Vishwanadh Bathula, Subarna Khanal, Jorg Wieszorek, University of Pittsburgh, Pittsburgh, PA, United States*

**3:09pm "A Comparative Assessment of the Structural, Elastic and Electronic Properties of Nb<sub>3</sub>Pt And NbPt<sub>3</sub> Phases Through First-Principles Study"**

Technical Paper Publication. IMECE2018-86911

*Romeo Sephyrin Fono-Tamo, University of Johannesburg, Johannesburg, South Africa, Tien-Chien Jen, Univ Of Johannesburg, Johannesburg, South Africa, Oliver Bhila, University of South Africa, Johannesburg, Gauteng, South Africa*

## **11-6 NANOENGINEERED, HIERARCHICAL, MULTI-SCALE MATERIALS AND STRUCTURES**

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**11-6-1 Nanoengineered, Hierarchical, Multi-Scale Materials and Structures**

**Third Floor, David L. Lawrence Convention Center, Room 336 3:45pm - 5:30pm**

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Session Chair: **Ram Mohan**, North Carolina A & T University, Greensboro, NC, United States

**3:45pm Integrating an Analytical Uncertainty Quantification Approach to Multi-Scale Modeling of Nanocomposites**

Technical Paper Publication. IMECE2018-86227

*Priya Agar, Virginia Tech, Blacksburg, VA, United States*

**4:06pm Simulation of Liquid Crystal Polymer Directionality During Cast Film Extrusion**

Technical Paper Publication. IMECE2018-86855

*Anthony Sullivan, Anil Saigal, Michael Zimmerman, Tufts University, Medford, MA, United States*

**4:27pm Hydrostatic Compression Constitutive Material Modeling of Two-Phase Cement Paste Composite Material Chemistry Structures**

Technical Presentation. IMECE2018-89136

*Ingrid Padilla Espinosa, North Carolina A&T State University, Greensboro, NC, United States, Ram Mohan, North Carolina A & T University, Greensboro, NC, United States, Wayne Hodo, US Army - ERDC, Vicksburg, MS, United States, John Rivas Murillo, North Carolina A&T State University, Greensboro, NC, United States*

**4:48pm Multiscale Finite Element Modeling of Ultra-High Performance Concrete**

**Technical Presentation.** IMECE2018-89167

*K.E. Bryan, Y. Hammi, Mississippi State University, Center for Advanced Vehicular Systems (CAVS), Starkville, MS, United States, M.Q. Chandler, USACE-ERDC, Vicksburg, MS, United States, R.D. Moser, US Army Engineer Research and Development Center, Vicksburg, MS, United States, M.N. Burcham, Mississippi State University, Center for Advanced Vehicular Systems (CAVS), Huntsville, AL, United States, D. Scott, U.S. Army Research and Development Center, Vicksburg, MS, United States, T.W. Stone, Mississippi State University, Center for Advanced Vehicular Systems (CAVS), Starkville, MS, United States, Mark Horstemeyer, Mississippi State Univ, Starkville, MS, United States*

**5:09pm 3D graphene foam for engineering advanced composites and metamaterials**

**Technical Presentation.** IMECE2018-89688

*Pranjal Nautiyal, Benjamin Boesl, Arvind Agarwal, Florida International University, Miami, FL, United States*

**11-13 MULTIPHYSICS AND MULTISCALE MODELING OF LITHIUM-ION BATTERIES**

**11-13-1 Multiphysics and Multiscale Modeling of Lithium-ion Batteries**

**Third Floor, David L. Lawrence Convention Center, Room 334 3:45pm - 5:30pm**

Session Chair: *Jun Xu, Beihang University, Beijing, China*  
Session Co-Chair: *Binghe Liu, Beijing University of Aeronautics and Astronautics, Beijing, China*

**3:45pm A detailed mechanical model of lithium-ion pouch batteries**

**Technical Presentation.** IMECE2018-89465

*Juner Zhu, Massachusetts Institute of Technology, Cambridge, MA, United States, Wei Li, Tsinghua University, Beijing, Beijing, China, Tomasz Wierzbicki, MIT, Cambridge, MA, United States*

**4:06pm Multiphysics Modeling of 18650 Battery under Mechanical Loading**

**Technical Presentation.** IMECE2018-89129

*Chunhao Yuan, Jun Xu, Lubing Wang, Beihang University, Beijing, China*

**4:27pm Assessing battery safety using a combined simulation approach from cell to vehicle level**

**Technical Presentation.** IMECE2018-89190

*Bernhard Brunnsteiner, AVL, Graz, Austria*

**4:48pm State-of-charge dependence of mechanical response of lithium-ion batteries: a result of internal stress**

**Technical Presentation.** IMECE2018-89392

*Wei Li, Xia Yong, Tsinghua University, Beijing, Beijing, China, Juner Zhu, Massachusetts Institute of Technology, Cambridge, MA, United States, Hailing Luo, Tsinghua University, Beijing, OO, China*

**5:09pm A Multiscale and Multiphysics Model for Lithium-Ion Full Cells with Silicon-Containing Anodes**

**Technical Presentation.** IMECE2018-89125

*Binghe Liu, Beijing University of Aeronautics and Astronautics, Beijing, China, Jun Xu, Beihang University, Beijing, China, Hanqing Jiang, Arizona State Univ, Tempe, AZ, United States*

**11-20 RECENT DEVELOPMENTS IN TRIBOLOGY**

**11-20-1 Recent Developments in Tribology**

**Third Floor, David L. Lawrence Convention Center, Room 335 3:45pm - 5:30pm**

Session Chair: *Patricia Iglesias, Rochester Institute of Technology, Rochester, NY, United States*

Session Co-Chair: *Hong Guo, Rochester Institute of Technology, Rochester, NY, United States*

**3:45pm The Effects of Single-Walled Carbon Nanotubes and Ionic Liquids in Reduction of Friction and Wear**

**Technical Paper Publication.** IMECE2018-86703

*Hong Guo, John Ackerman, Steven Keil, Ivan Puchades, Brian Landi, Patricia Iglesias, Rochester Institute of Technology, Rochester, NY, United States*

**4:06pm Effect of Carbon Nanotube-Phosphinate Ionic Liquid Thin Boundary Layer on the Tribological Behavior of Aluminum Alloy in Steel-on-Aluminum Contact**

**Technical Paper Publication.** IMECE2018-86875

*Miguel Gutierrez, Michael Gydesen, Caitlin Marcellus, Ivan Puchades, Brian Landi, Patricia Iglesias, Rochester Institute of Technology, Rochester, NY, United States*

**4:27pm Estimation of Energy Conservation in Internal Combustion Engine Vehicles Using Ionic Liquid As an Additive**

**Technical Paper Publication.** IMECE2018-87002

*Sameer A. Magar, Hong Guo, Patricia Iglesias, Rochester Institute of Technology, Rochester, NY, United States*

**4:48pm Surface Characterization of Trim Dies and Trimmed Edges in Sheet Metal Shearing**

**Technical Presentation.** IMECE2018-89542

*Xin Wu, Ameer Al-Shawk, Wayne State University, Detroit, MI, United States*

**5:09pm Ionic Liquids As Additives of Cutting Fluids to Reduce Machine Tool Friction and Wear**

**Technical Paper Publication.** IMECE2018-86810

*Patricia Iglesias, Christopher Ferri, Sydney Lizarazo, Michael Troise, Rochester Institute of Technology, Rochester, NY, United States*

**Draft Program**

# Mechanics of Solids, Structures and Fluids MONDAY, NOVEMBER, 12

## 12-1 MECHANICS OF SOFT MATERIALS

### 12-1-1 Mechanics of Soft Materials: Structure

Third Floor, David L. Lawrence Convention Center,  
Room 333 9:45am - 11:30am

Session Chair: **Shengqiang Cai**, *UC San Diego, La Jolla, CA, United States*

**9:45am** Origomu: The geometry and mechanics of folding polymer films and shells

Invited Presentation. IMECE2018-89449

**Ryan Hayward**, *University of Massachusetts Amherst, Amherst, MA, United States*

**10:27am** Origami/Kirigami-Guided Morphing of Composite Sheets

Technical Presentation. IMECE2018-89357

**Jianxun Cui**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Felipe Poblete**, **Yong Zhu**, *North Carolina State University, Raleigh, NC, United States*

**10:48am** Nonlinear Mechanics of Soft Substrates with Surface Topology

Technical Presentation. IMECE2018-88272

**Ranajay Ghosh**, *University of Central Florida, Orlando, FL, United States*, **Hossein Ebrahimi**, *University of Central Florida, Orlando, FL, United States*, **Hossein Ali**, *University of Central Florida, Orlando, FL, United States*

**11:09am** Deformation of Radially Symmetric Shape Memory Polymer Discs

Technical Presentation. IMECE2018-89289

**Russell Mailen**, *Auburn University, Auburn, AL, United States*, **Catherine Wagner**, **Jan Genzer**, **Michael D. Dickey**, *North Carolina State University, Raleigh, NC, United States*, **Mohammed Zikry**, *North Carolina State Univ, Raleigh, NC, United States*

## 12-6 IN-SITU TECHNIQUES IN EXPERIMENTAL MECHANICS

### 12-6-1 In-Situ Techniques in Experimental Mechanics

Fourth Floor, David L. Lawrence Convention Center,  
Room 402 9:45am - 11:30am

Session Chair: **Ryan Berke**, *Utah State University, Logan, UT, United States*

**9:45am** Experimental Characterization of Polymer Films and Fabrics at Intermediate Strain Rates

Technical Presentation. IMECE2018-89739

**Alireza Amirkhizi**, **Fateme Aghighi**, **David Roux**, *University of Massachusetts, Lowell, Lowell, MA, United States*

**10:06am** Real-time Visualization of GaN/Al-GaN High Electron Mobility Transistor Failure at Off-state

Technical Presentation. IMECE2018-89116

**Zahabul Islam**, *The Pennsylvania State University, State College, PA, United States*, **Md Haque**, *Penn State University, University Park, PA, United States*, **NICHOLAS GLAVIN**, *Air Force Research Laboratory, Ohio, OH, United States*

**10:27am** Characterization of the Micromechanical Evolution of Ti-7Al Under the Cyclic Loading Using High Energy X-Ray Diffraction Microscopy

Technical Presentation. IMECE2018-89152

**Rachel E. Lim**, *Carnegie Mellon University, Pittsburgh, PA, United States*, **Darren C. Pagan**, *Cornell High Energy Synchrotron Source, Ithaca, NY, United States*, **Vahid Tari**, **Yufeng Shen**, **Robert M. Suter**, **Anthony D. Rollett**, *Carnegie Mellon University, Pittsburgh, PA, United States*

**10:48am** In Situ Observation on Temperature Dependence of Martensitic Transformation and Plastic Deformation in Superelastic NiTi Alloy

Technical Presentation. IMECE2018-88828

**Yao Xiao**, **Pan Zeng**, **Liping Lei**, *Tsinghua University, Beijing, China*

## 12-10 MODELING AND EXPERIMENTS IN NANOMECHANICS AND NANOMATERIALS

### 12-10-1 Modeling and Experiments in Nanomechanics and Nanomaterials 1

Third Floor, David L. Lawrence Convention Center,  
Room 333 9:45am - 11:30am

Session Chair: **Yozo Mikata**, *Bechtel, Niskayuna, NY, United States*

Session Co-Chair: **Jeffrey Kysar**, *Columbia University, New York, NY, United States*, **Scott Price**, *G E Research Center, Niskayuna, NY, United States*, **Changhong Ke**, *State Univ Of Ny, Binghamton, NY, United States*

**9:45am** Post-Buckled Deformation of Graphene

Technical Presentation. IMECE2018-88585

**Yozo Mikata**, *Bechtel, Niskayuna, NY, United States*

**10:06am** Material design for nanosized FePd ferromagnetic shape memory alloy nano-materials by thermodynamics and dislocation punching models

Technical Presentation. IMECE2018-89454

**Minoru Taya**, *University of Washington, Seattle, WA, United States*

**10:27am** Probing the Structural and Mechanical Properties of Boron Nitride Nanosheets

Technical Presentation. IMECE2018-87093

**Wenyang Qu**, **Feilin Gou**, *State University of New York at Binghamton, Binghamton, NY, United States*, **Xiaoming Chen**, *Xi'an Jiaotong University, Xi'an, Shaanxi, China*, **Changhong Ke**, *State Univ Of Ny, Binghamton, NY, United States*

**10:48am**                    **Probing Mechanics of Monolayer Two-Dimensional Nanomaterials**  
Technical Presentation. IMECE2018-86296  
*Yingchao Yang, University of Maine, Orono, ME, United States*

**11:09am**                    **Mechanics of Nanofiber Packing in Vesicles: Effects of Fiber Length, Radius, and Elasticity**  
Technical Presentation. IMECE2018-88975  
*Xin Yi, Peking University, Beijing, China, Guijin Zou, Huajian Gao, Brown University, providence, RI, United States*

**12-15 INAUGURAL SYMPOSIUM ON THE CONSTITUTIVE MODELING OF THE MECHANICAL BEHAVIOR AND PERFORMANCE OF ELECTRONIC, PHOTONIC, MEMS, AND NEMS MATERIALS, ASSEMBLIES, PACKAGES, MODULES, AND SYSTEMS**

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**12-15-1 Inaugural Symposium on the Constitutive Modeling of the Mechanical Behavior and Performance of Electronic, Photonic, MEMS, and NEMS Materials, Assemblies, Packages, Modules, and Systems**

**Room 331      9:45am - 11:30am**

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Session Chair: **Martin Ostoja-Starzewski, Univ Of Illinois Urbana, Urbana, IL, United States**

**9:45am**                    **Equivalent Material Properties for Thermo-mechanical Modeling of Microelectronic Packages**  
Technical Presentation. IMECE2018-62388  
*Yu-Lin Shen, Univ of New Mexico, Albuquerque, NM, United States*

**10:00am**                    **Does a fractal microstructure require a fractional viscoelastic model?**  
Technical Presentation. IMECE2018-88369  
*Martin Ostoja-Starzewski, Univ Of Illinois Urbana, Urbana, IL, United States, Jun Zhang, University of Illinois at Urbana-Champaign, Urbana, IL, United States*

**10:15am**                    **Anisotropic Hill Constants for Steady-state Creep Behavior of Single Crystal SnAgCu Joints Based on Multi-scale Modeling**  
Technical Presentation. IMECE2018-88791  
*Qian Jiang, University of Maryland, College Park, MD, United States, Abhijit Dasgupta, CALCE, University of Maryland, College Park, MD, United States*

**10:30am**                    **Constitutive Model for Pressure-Sensitive Adhesive (PSA) Joints**  
Technical Presentation. IMECE2018-88796  
*Hao Huang, Abhijit Dasgupta, CALCE, University of Maryland, College Park, MD, United States*

**10:45am**                    **Alleviating Thermomechanical Wrinkling in Functionally Graded Sandwich Panels using Nanoscale Reinforcement of the Core Material**  
Technical Presentation. IMECE2018-88817  
*Victor Birman, Missouri University of Science and Technology, St Louis, MO, United States*

**11:00am**                    **An Overview of Thermomechanical Fatigue in Cu Interconnects: Probabilistic and Statistical Considerations for Robust Design and Qualification**  
Technical Presentation. IMECE2018-88843  
*John Evans, NASA, Washington, DC, United States, Bhanu Sood, NASA, Greenbelt, MD, United States, Michael Osterman, University of Maryland, College Park, MD, United States*

**12-18 COMPUTATIONAL MODELING OF EXTREME EVENTS**

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**12-18-1 Computational Modeling of Extreme Events**

**Third Floor, David L. Lawrence Convention Center, Room 336      9:45am - 11:30am**

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Session Chair: **Jason Roth, U.S. Army - ERDC, Vicksburg, MS, United States**

**9:45am**                    **Data-Driven, Co-Designed Simulations and Experiments of Shock Synthesis**  
Invited Presentation. IMECE2018-88032  
*Karel Matou?, University of Notre Dame, Notre Dame, IN, United States*

**10:27am**                    **MODELING AND SIMULATIONS ON COUPLED PLASTIC FLOWS AND PLASTIC STRAIN-INDUCED PHASE TRANSFORMATIONS IN DIAMOND ANVIL CELLS**  
Technical Presentation. IMECE2018-89055  
*Biao Feng, Los Alamos National Laboratory, Los Alamos, NM, United States, Valery Levitas, Iowa State University, Ames, IA, United States*

**10:40am**                    **Dynamic fragmentation of brittle materials using Eulerian methods**  
Technical Presentation. IMECE2018-89448  
*Vinamra Agrawal, Auburn University, Auburn, AL, United States*

**11:09am**                    **A Comparison of Mesh-free and Mesh-based Lagrangian Approximations of Manufactured Shear-Dominated Deformation Fields**  
Technical Presentation. IMECE2018-89219  
*Joseph Bishop, Sandia National Laboratories, Albuquerque, NM, United States*

**12-19 COMPUTATIONAL FLUID-STRUCTURE INTERACTION**

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**12-19-1 Computational Fluid-Structure Interaction**

**Room 338      9:45am - 11:30am**

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Session Chair: **Artem Korobenko, University of Calgary, Calgary, AB, Canada**

**Draft Program**

**9:45am** Fluid-structure interaction between pulsatile blood flow and a curved stented coronary artery on a beating heart: a four stent computational study

Technical Presentation. IMECE2018-88827

*Suncica Canic*, University of California, Berkeley, Houston, TX, United States, *Martina Bukac*, University of Notre Dame, South Bend, IN, United States, *Josip Tambaca*, University of Zagreb, Zagreb, Croatia (Hrvatska), *Yifan Wang*, University of California, Berkeley, Berkeley, CA, United States

**10:06am** Fluid-Structure Interaction Modeling of Transcatheter Heart Valve Replacements

Technical Presentation. IMECE2018-90003

*Ming-Chen Hsu*, *Michael C.H. Wu*, Iowa State University, Ames, IA, United States

**10:27am** Fluid-Structure Interaction in Abdominal Aortic Aneurysm

Technical Presentation. IMECE2018-89030

*Siyeong Ju*, University of Nebraska at Lincoln, Lincoln, NE, United States, *Linxia Gu*, University of Nebraska-Lincoln, Lincoln, NE, United States, *Shengmao Lin*, University of Nebraska at Lincoln, Lincoln, NE, United States, *Xinwei Han*, *Yonghua Bi*, Zhengzhou University, Zhengzhou, China

**10:48am** An Open-source Framework for FSI of Bio-Inspired Flows at High Reynolds Number

Technical Presentation. IMECE2018-89308

*Andrew Guarendi*, *Christin Murphy*, Naval Undersea Warfare Center, Newport, RI, United States, *Jennifer Franck*, University of Wisconsin-Madison, Madison, WI, United States

**11:09am** Optimizing the geometry of a foil for extracting power from an incident free stream

Technical Presentation. IMECE2018-89688

*Shreyas Mandre*, *Kenny Breuer*, Brown University, Providence, RI, United States, *Michael Miller*, Brown University, Pawtucket, RI, United States

## 12-22 DEFORMATION AND FAILURE OF MULTIFUNCTIONAL MATERIALS

**12-22-1 Deformation and Failure of Multifunctional Materials**

**Fourth Floor, David L. Lawrence Convention Center, Room 401 9:45am - 11:30am**

Session Chair: *Charles Wojnar*, Missouri S&T, Rolla, MO, United States

**9:45am** Study of the Effect of Large Deformation Through a Finite Deformation Based Constitutive Model for Metallic Glasses

Technical Paper Publication. IMECE2018-86063

*Shank S. Kulkarni*, University of North Carolina at Charlotte, Charlotte, NC, United States, *Tanmay K. Bhandakkar*, Indian Institute of Technology Bombay, Mumbai, India

**10:06am** A FINITE STRAIN CONSTITUTIVE MODEL FOR POLYCRYSTALLINE SHAPE MEMORY ALLOYS ACCOUNTING FOR PSEUDOELASTICITY, ONE WAY SHAPE MEMORY EFFECT, ORIENTATION, REORIENTATION, FERROELASTICITY?, AND LATENT HEAT

Technical Presentation. IMECE2018-88820

*Theocharis Baxevanis*, *Mengqian Zhang*, University of Houston, Houston, TX, United States

**10:27am** Asymptotic Analysis of Sponge Spicules' Sensitivity to Geometric Imperfection Regarding to Buckling Instability.

Technical Presentation. IMECE2018-89173

*Wenqiang Fang*, *Michael Monn*, *Haneesh Kesari*, Brown University, Providence, RI, United States

**10:48am** On Buckling Analysis for Biomedical Shape Memory Alloy Stent Graft under Axial, Lateral and Combined Loadings

Technical Presentation. IMECE2018-89457

*Lei Xu*, *Hector Larin*, Texas A&M University, College Station, TX, United States, *Dimitris Lagoudas*, Texas A&M Univ, College Station, TX, United States

## 12-28 INSTABILITIES IN SOLIDS AND STRUCTURES

**12-28-1 Instabilities in Solids and Structures: Mechanics of Slender Solids**

**Third Floor, David L. Lawrence Convention Center, Room 334 9:45am - 11:30am**

Session Chair: *Stavros G. Giannaris*, Johns Hopkins University, Baltimore, MD, United States

Session Co-Chair: *Pedro Reis*, EPFL (Switzerland), Lausanne, VD, Switzerland

**9:45am** Untangling the Mechanics of Elastic Knots

Technical Presentation. IMECE2018-89092

*Pedro Reis*, EPFL (Switzerland), Lausanne, VD, Switzerland, *Paul Johanns*, *Paul Grandgeorge*, École polytechnique fédérale de Lausanne (EPFL), Lausanne, VD, Switzerland

**10:06am** Bistable inflatable origami-inspired structures

Technical Presentation. IMECE2018-89330

*Katia Bertoldi*, *David Melancon*, *Chuck Hoberman*, Harvard University, Cambridge, MA, United States, *Jason Ku*, *Erik Demaine*, MIT, Cambridge, MA, United States

**10:27am** Exploiting Structural Buckling: A Novel Manufacturing Approach to Three-Dimensional Functional Mesostructures

Technical Presentation. IMECE2018-89859

*Xin Ning*, The Pennsylvania State University, Urbana, IL, United States, *John Rogers*, Northwestern University, Evanston, IL, United States

**10:48am** Tunable Bistability of Clamped Elastic Beams

Technical Presentation. IMECE2018-89925

*Yin Liu*, *Zhe Xu*, *Lin Dong*, *Xiaomin Han*, *John X.J. Zhang*, *Zi Chen*, Dartmouth College, Hanover, NH, United States

**11:09am** Mechanically-guided assembly of complex 3D mesostructures by compressive buckling: Kirigami-inspired 3D membranes and strain engineering of elastomer substrates

Technical Presentation. IMECE2018-89161

*Haiwen Luan, Northwestern University, Evanston, IL, United States, Yihui Zhang, Tsinghua University, Beijing, China, Yong-gang Huang, Northwestern Univ, Evanston, IL, United States*

## **12-1 MECHANICS OF SOFT MATERIALS**

**12-1-2 Mechanics of Soft Materials: Gels/Active Materials 1**

**Third Floor, David L. Lawrence Convention Center, Room 333 1:45pm - 3:30pm**

Session Chair: **Shawn Chester**, *New Jersey Institute of Technology, North Caldwell, NJ, United States*

**1:45pm** Micro-Mechanical Modeling of the Stress Softening in Double-Network Hydrogels

Technical Paper Publication. IMECE2018-88252

*Vahid Morovati, Roozbeh Dargazany, Michigan state university, EAST LANSING, MI, United States*

**2:00pm** Poroelastic Effects on Fracture of Gels

Technical Presentation. IMECE2018-88961

*Yalin Yu, University of Texas At Austin, Austin, TX, United States, Chad Landis, The University Of Texas At Austin, Austin, TX, United States, Rui Huang, Univ Of Texas At Austin, Austin, TX, United States*

**2:15pm** Anti-fatigue fracture hydrogels by designing crystalline domains

Technical Presentation. IMECE2018-89088

*Shaoting Lin, Xuanhe Zhao, MIT, Cambridge, MA, United States*

**2:30pm** Modeling fiber-reinforced polymeric gels

Technical Presentation. IMECE2018-89417

*Nikola Bosnjak, New Jersey Institute of Technology, Newark, NJ, United States, Howon Lee, Rutgers University, Piscataway, NJ, United States, Shawn Chester, New Jersey Institute of Technology, North Caldwell, NJ, United States*

**2:45pm** A WENO Finite-Difference Scheme for a New Class of Hamilton-Jacobi Equations in Nonlinear Solid Mechanics

Technical Presentation. IMECE2018-89236

*Victor Lefevre, Northwestern University, Evanston, IL, United States, Oscar Lopez-Pamies, University of Illinois at Urbana-Champaign, Urbana, IL, United States*

**3:00pm** Liquid Metal Elastomer Composites for Low Temperature Applications

Technical Presentation. IMECE2018-89665

*Mohammad H. Malakooti, Navid Kazem, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States*

## **12-10 MODELING AND EXPERIMENTS IN NANOMECHANICS AND NANOMATERIALS**

**12-10-2 Modeling and Experiments in Nanomechanics and Nanomaterials 2**

**Third Floor, David L. Lawrence Convention Center, Room 335 1:45pm - 3:30pm**

Session Chair: **Yozo Mikata**, *Bechtel, Niskayuna, NY, United States*

Session Co-Chair: **Jeffrey Kysar**, *Columbia University, New York, NY, United States, Yingchao Yang, University of Maine, Orono, ME, United States*

**1:45pm** Nano-Emitter Mass-loss Mechanisms and Predicted Damage Patterns

Technical Presentation. IMECE2018-88076

*Scott Price, G E Research Center, Niskayuna, NY, United States, Yozo Mikata, Bechtel, Niskayuna, NY, United States*

**2:06pm** Direct Nanomechanical Measurements of Carbon Nanotube-Metal Interfaces

Technical Presentation. IMECE2018-87078

*Chenglin Yi, Christopher M. Dmuchowski, Feilin Gou, State University of New York at Binghamton, Binghamton, NY, United States, Xiaoming Chen, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Cheol Park, NASA Langley Research Center, Hampton, VA, United States, Changhong Ke, State Univ Of Ny, Binghamton, NY, United States*

**2:22pm** Structural and Mechanical Properties of Boron Nitride Nanotubes in High Temperature Environments

Technical Presentation. IMECE2018-87074

*Xiaoming Chen, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Christopher M. Dmuchowski, State University of New York at Binghamton, Binghamton, NY, United States, Cheol Park, Catharine C. Fay, NASA Langley Research Center, Hampton, VA, United States, Changhong Ke, State Univ Of Ny, Binghamton, NY, United States*

**2:48pm** Mechanical and Electrical Properties of Graphene Nano Mesh Heterojunctions

Technical Presentation. IMECE2018-87021

*Ji Zhang, University At Buffalo, State University of New York, Buffalo, NY, United States, Weixiang Zhang, SUNY At Buffalo, Buffalo, NY, United States, Tarek Ragab, Arkansas State University, State University, AR, United States, Cemal Basaran, State Univ Of New York at Buffalo, Buffalo, NY, United States*

**3:09pm** Electron-Induced wind forces in metallic graphene nanoribbons

Technical Presentation. IMECE2018-87022

*Ji Zhang, University At Buffalo, State University of New York, Buffalo, NY, United States, Tarek Ragab, Arkansas State University, State University, AR, United States, Cemal Basaran, State Univ Of New York at Buffalo, Buffalo, NY, United States*

## 12-18 COMPUTATIONAL MODELING OF EXTREME EVENTS

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### 12-18-2 Computational Modeling of Extreme Events

Third Floor, David L. Lawrence Convention Center,  
Room 336 1:45pm - 3:30pm

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Session Chair: **Jason Roth**, U.S. Army - ERDC, Vicksburg, MS, United States

**1:45pm** Constitutive Models and their Application to Predict Geomaterial Failure Resulting from Embedded Detonations

Technical Presentation. IMECE2018-86714

**Andy Frank**, **Jessica Fulk**, **Jason Roth**, **Mike Hammons**, U.S. Army - ERDC, Vicksburg, MS, United States

**2:27pm** Dislocation mobility and non-Schmid effects in HMX under high pressures

Technical Presentation. IMECE2018-89294

**Anirban Pal**, **Mohammad Khan**, Rensselaer Polytechnic Institute, Troy, NY, United States, **Catalin Picu**, Rensselaer Polytechnic Inst, Troy, NY, United States

**2:48pm** MODELING PLASTIC SLIP, TWINNING AND PHASE TRANSFORMATION IN SINGLE CRYSTAL TITANIUM UNDER DYNAMIC LOADING CONDITIONS

Technical Presentation. IMECE2018-89056

**Biao Feng**, Los Alamos National Laboratory, Los Alamos, NM, United States, **Curt Bronkhorst**, Los Alamos National Laboratory, Los Alamos, NM, United States

**3:09pm** Simulation of Delayed Hydride Cracking Behavior in Zircaloy Cladding Tubes Considering Irradiation Damage Effects

Technical Presentation. IMECE2018-89541

**Shurong Ding**, **Zhongjia Xia**, **Jingyu Zhang**, Fudan University, Shanghai, China

## 12-19 COMPUTATIONAL FLUID-STRUCTURE INTERACTION

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### 12-19-2 Computational Fluid-Structure Interaction

Room 338 1:45pm - 3:30pm

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Session Chair: **Artem Korobenko**, University of Calgary, Calgary, AB, Canada

**1:45pm** A Dual-Solver Hybrid Approach for Fluid-Structure Interaction of Rotating Systems

Technical Presentation. IMECE2018-89309

**Marilyn Smith**, Georgia Institute of Technology, Atlanta, GA, GA, United States, **Glen Whitehouse**, Continuum Dynamics Inc, Ewing, NJ, United States

**2:06pm** Computational Aeroelasticity for Systems with Flexible Wings

Technical Presentation. IMECE2018-88847

**Balakumar Balachandran**, University of Maryland, College Park, Rockville, MD, United States

**2:27pm** Constructal Approach in Design of High Aspect-Ratio Aircraft: The Concept of Flow of Stresses and Aeroelastic Stability

Technical Presentation. IMECE2018-87824

**Pezhman Mardanpour**, Florida International University, Weston, FL, United States, **Ehsan Izadpanahi**, Florida International University, Miami, FL, United States, **Siavash Rastkar**, FIU, Miami, FL, United States, **Sylvie Lorente**, University of Toulouse, INSA, Toulouse, France, **Adrian Bejan**, Duke Univ, Durham, NC, United States

**2:48pm** Fluid-Structure Interaction Framework for Compressible Flows

Technical Presentation. IMECE2018-90045

**Artem Korobenko**, University of Calgary, Calgary, AB, Canada, **Yuri Bazilevs**, Brown University, Providence, RI, United States, **Ming-Chen Hsu**, Iowa State University, Ames, IA, United States, **David Kamensky**, **Georgios Moutsanidis**, Brown University, Providence, RI, United States

## 12-28 INSTABILITIES IN SOLIDS AND STRUCTURES

12-28-2 Instabilities in Solids and Structures: Numerical/Analytical stability

Third Floor, David L. Lawrence Convention Center,  
Room 334 1:45pm - 3:30pm

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Session Chair: **Xin Ning**, The Pennsylvania State University, Urbana, IL, United States

Session Co-Chair: **Nicolas Triantafyllidis**, Ecole Polytechnique, Palaiseau, France

**1:45pm** Hierarchical honeycomb material design and optimization: Beyond linearized behavior

Technical Presentation. IMECE2018-89386

**Christelle Combescure**, Université Paris-Est Marne-la-Vallée, Champs-sur-Marne, France, **Ryan Elliott**, University of Minnesota, Saint Paul, MN, United States

**2:06pm** Numerical energy relaxation and associated microstructure formation in problems with non-convex energetic potentials

Technical Presentation. IMECE2018-89532

**Siddhant Kumar**, **Vidyasagar Ananthan**, California Institute of Technology, Pasadena, CA, United States, **Dennis Kochmann**, ETH Zurich, Zurich, Switzerland

**2:27pm** Fracture and Healing in Elastomers: A Phase-Transition Theory and Numerical Implementation

Technical Presentation. IMECE2018-89171

**Aditya Kumar**, University of Illinois, Urbana-Champaign, Urbana, IL, United States, **Krishnaswamy Ravi-Chandar**, Univ Of Texas/Austin, Austin, TX, United States, **Gilles A. Francfort**, Courant Institute of Mathematical Sciences, New York, NY, United States, **Oscar Lopez-Pamies**, University of Illinois at Urbana-Champaign, Urbana, IL, United States

**2:48pm** Post-buckling Analysis of Wide Beams

Technical Presentation. IMECE2018-89367

**Yuzhen Chen**, UCLA, Los Angeles, CA, United States, **Lihua Jin**, University of California, Los Angeles, Los Angeles, CA, United States

Draft Program

**3:09pm STABILITY ANALYSIS OF STEP DYNAMICS IN CRYSTAL GROWTH**

Technical Presentation. IMECE2018-89128

*Laurent GUIN, Michel JABBOUR, LMS, Ecole Polytechnique, Palaiseau, France, Nicolas Triantafyllidis, Ecole Polytechnique, Palaiseau, France*

**12-33 CONGRESS-WIDE SYMPOSIUM ON NDE &SHM - NONDESTRUCTIVE CHARACTERIZATION OF SOLIDS, STRUCTURES AND FLUIDS**

**12-33-1 Congress-Wide Symposium on NDE &SHM - Nondestructive characterization of Solids, Structures and Fluids**

**Room 331 1:45pm - 3:30pm**

Session Chair: **Soumik Banerjee**, Washington State University, Pullman, WA, United States

**1:45pm Integrity Evaluation of Composite Cylindrical Structures**

Technical Paper Publication. IMECE2018-87158

*Jikai Du, State University of New York College at Buffalo, Buffalo, NY, United States*

**2:06pm Locating and Quantifying Through Circular Damage in CNT/GFRP Composite Panel Using Gaussian Fit**

Technical Paper Publication. IMECE2018-87681

*Kerim Iikardaslar, CCNY/CUNY, New York, NY, United States, Feridun Delale, The City College of New York, New York, NY, United States, Mahmoud A. Debi, The Borough of Manhattan Community College / CUNY, NEW YORK, NY, United States, Salih Yildiz, Kenneth Gollins, The City College of New York, New York, NY, United States*

**2:27pm Analysis Alkali-Silica Reaction in Concrete with Electromagnetic Methods**

Technical Presentation. IMECE2018-88034

*Alexander Heifetz, Argonne National Laboratory, Lemont, IL, United States, Anthony Bentivegna, CTLGroup, Skokie, IL, United States, Sasan Bakhtiari, Argonne National Laboratory, Lemont, IL, United States*

**2:48pm Entropy as an indicator of stress-relaxation in composites**

Technical Presentation. IMECE2018-89100

*Subir Patra, Sourav Banerjee, University of South Carolina, Columbia, SC, United States*

**3:09pm Prediction of Leak Rates Through Porous Materials Using Analytical and Numerical Approaches**

Technical Paper Publication. IMECE2018-88683

*Ali Salah Omar Aweimer, École de Technologie Supérieure, Montreal, QC, Canada, Abdel-Hakim Bouzid, Ecole Technologie Supérieure, Montreal, QC, Canada, Zijian Zhao, Skyeetech Ltd., Shenyang, China*

**12-36 KEYNOTE LECTURES ON COMPUTATIONAL MECHANICS**

**12-36-1 Keynote Lectures on Computational Mechanics - 1**

**Fourth Floor, David L. Lawrence Convention Center, Room 402 1:45pm - 3:30pm**

Session Chair: **Qian Qian**, University of Texas at Dallas, Richardson, TX, United States

Session Co-Chair: **Caglar Oskay**, Vanderbilt University, Nashville, TN, United States

**1:45pm Coupled Shock-Plasticity-Damage Modeling of Explosive Welding by RKPM**

Invited Presentation. IMECE2018-88929

*Jiun-Shyan Chen, University of California, San Diego, La Jolla, CA, United States, Jonghyuk Baek, UCSD, La Jolla, CA, United States*

**2:27pm Computational Design of Phononic Topological Insulators**

Invited Presentation. IMECE2018-89015

*Harold Park, Boston University, Brookline, MA, United States, Nanthakumar Subbiah, Xiaoying Zhuang, Leibniz University Hannover, Hannover, Germany, Timon Rabczuk, Bauhaus-University Weimar, Weimar, Germany*

**3:09pm Emerging Trends in Computational Mechanics ? Data Driven Computation and Mechanics**

Technical Presentation. IMECE2018-88908

*Ashfaq Adnan, University of Texas Arlington, Arlington, TX, United States*

**12-38 YOUNG MEDALIST SYMPOSIUM**

**12-38-1 Young Medalist Symposium**

**Fourth Floor, David L. Lawrence Convention Center, Room 401 1:45pm - 3:30pm**

Session Chair: **Yihui Zhang**, Tsinghua University, Beijing, China

**1:45pm Propagating Transition Fronts in (Meta-)Materials: From Simple Chains To 2D Patterns**

Technical Presentation. IMECE2018-89052

*Dennis Kochmann, Romik Khajehtourian, ETH Zurich, Zurich, Switzerland, Michael Frazier, UC San Diego, La Jolla, CA, United States, Katia Bertoldi, Harvard University, Cambridge, MA, United States*

**2:06pm Evolution of Stress and Structure during Electrochemical Cycling of Sulfur Cathodes**

Technical Presentation. IMECE2018-89256

*Matt Pharr, Texas A&M University, College Station, TX, United States*

**2:27pm Energy Localization in Nonlinear Dynamical Systems: Design, Measurement, and Control**

Technical Presentation. IMECE2018-88949

*Edmon Perkins, Auburn University, Auburn, AL, United States*

**2:48pm** Coarse-graining out of equilibrium: from particles to dissipative PDEs

Technical Presentation. IMECE2018-88948

*Celia Reina, Xiaoguai Li, University of Pennsylvania, Philadelphia, PA, United States, Nicolas Dirr, Peter Embacher, University of Cardiff, Cardiff, United Kingdom, Johannes Zimmer, University of Bath, Bath, United Kingdom*

## **12-1 MECHANICS OF SOFT MATERIALS**

**12-1-3 Mechanics of Soft Materials: Gels/Active Materials 2**

**Third Floor, David L. Lawrence Convention Center, Room 333 3:45pm - 5:30pm**

Session Chair: **Shawn Chester**, *New Jersey Institute of Technology, North Caldwell, NJ, United States*

**3:45pm** Phase separation in elastomeric gels

Technical Presentation. IMECE2018-88670

*Wei Hong, Iowa State University, Ames, IA, United States*

**4:06pm** New insights on the viscoelastic behavior of polymeric gels

Technical Presentation. IMECE2018-89413

*Nikola Bosnjak, Justin Newkirk, New Jersey Institute of Technology, Newark, NJ, United States, Shawn Chester, New Jersey Institute of Technology, North Caldwell, NJ, United States*

**4:27pm** Swelling, Dynamics And Viscoelasticity of Hydrogels

Technical Presentation. IMECE2018-92866

*Si Chen, University of Texas at Austin, Austin, TX, United States, Krishnaswamy Ravi-Chandar, Univ Of Texas/Austin, Austin, TX, United States*

**4:48pm** Comparison between temperature-dependent mechanical properties of thermo-responsive Poly (vinyl alcohol) Poly (N-isopropyl acrylamide) hydrogel and non-thermo-responsive Alginate hydrogel

Technical Presentation. IMECE2018-87790

*Yuqi Jin, Shuai Ju, Hyeonu Heo, University of North Texas, Denton, TX, United States, Ezekiel Walker, Echonovus Inc., Denton, TX, United States, Haifeng Zhang, Tae-Youl Choi, Arup Neogi, University of North Texas, Denton, TX, United States*

**5:09pm** A New Scaling Law for Describing How Water Content Affects Elastic Modulus and Fracture Energy of Hydrogels

Technical Presentation. IMECE2018-89158

*Zishun Liu, Xi'an Jiaotong University, Xi'an, OO, China, Ziqian Li, Xi'an Jiaotong University, Xi'an, OO, China*

## **12-10 MODELING AND EXPERIMENTS IN NANOMECHANICS AND NANOMATERIALS**

**12-10-3 Modeling and Experiments in Nanomechanics and Nanomaterials 3**

**Third Floor, David L. Lawrence Convention Center, Room 335 3:45pm - 5:30pm**

Session Chair: **Yozo Mikata**, *Bechtel, Niskayuna, NY, United States*

Session Co-Chair: **Jeffrey Kysar**, *Columbia University, New York, NY, United States, George Voyiadjis, Louisiana State Univ, Baton Rouge, LA, United States, Tarek Ragab, Arkansas State University, State University, AR, United States*

**3:45pm** Modeling of Indentation Size Effect in Amorphous Polymers

Technical Presentation. IMECE2018-87076

*George Voyiadjis, Louisiana State Univ, Baton Rouge, LA, United States, Leila Malekmoie, Aref Samadi-Dooki, Louisiana State University, Baton Rouge, LA, United States*

**4:06pm** Frictional Properties of Graphene Nano Flakes on Diamond Substrate

Technical Presentation. IMECE2018-89268

*Ji Zhang, University At Buffalo, State University of New York, Buffalo, NY, United States, Ehsan Osloub, Fatima Siddiqui, University at Buffalo, SUNY, Amherst, NY, United States, Weixiang Zhang, SUNY At Buffalo, Buffalo, NY, United States, Tarek Ragab, Arkansas State University, State University, AR, United States, Genal Pasara, State Univ Of New York at Buffalo, Buffalo, NY, United States*

**4:27pm** Tuning the Contact Angle and Evaporation Rate of Water Droplets on Laser Processed Graphene Flakes

Technical Presentation. IMECE2018-89949

*Srilok Srinivasan, Iowa State University, Ames, IA, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Suprem Das, Kansas State University, Manhattan, KS, United States*

**4:48pm** Mechanistic Insights into Crystalline Interfaces via Thermal Fluctuations

Technical Presentation. IMECE2018-89997

*Dengke Chen, Georgia Institute of Technology, Atlanta, GA, United States, Yashashree Kulkarni, University of Houston, Houston, TX, United States*

**5:09pm** OpenKIM: Reliable Interatomic Models for Multiscale Simulations

Technical Presentation. IMECE2018-89384

*Ryan Elliott, University of Minnesota, Saint Paul, MN, United States, Ellad Tadmor, Daniel Karls, University of Minnesota, Minneapolis, MN, United States, James Sethna, Cornell University, Ithaca, NY, United States*

## 12-13 RECENT ADVANCES AND APPLICATIONS IN MESHFREE AND PARTICLE METHODS

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### 12-13-1 Recent Advances and Applications in Meshfree and Particle Methods

Third Floor, David L. Lawrence Convention Center, Room 336 3:45pm - 5:30pm

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Session Chair: **Sheng-Wei Chi**, *University of Illinois at Chicago, Chicago, IL, United States*

Session Co-Chair: **Pablo Seleson**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*

#### 3:45pm Methods and Challenges of Material Failure Modeling and Multiscale Computation in Industrial Applications

Technical Presentation. IMECE2018-88772

**C.T. Wu, Wei Hu, Bo Ren, Youcai Wu**, *LSTC, Livermore, CA, United States*, **Yong Guo**, *Livermore Software Technology, Livermore, CA, United States*, **Xiaofei Pan, Zeliang Liu**, *LSTC, Livermore, CA, United States*

#### 4:20pm Generalized Reproducing Kernel Peridynamics

Technical Presentation. IMECE2018-89871

**Michael Hillman**, *Pennsylvania State University, University Park, PA, United States*

#### 4:35pm Convergence studies in meshfree peridynamic simulations

Technical Presentation. IMECE2018-89982

**Pablo Seleson**, *Oak Ridge National Laboratory, Oak Ridge, TN, United States*, **David Littlewood**, *Sandia National Laboratories, Albuquerque, NM, United States*

#### 4:50pm On the stability of the generalized, ordinary, finite deformation constitutive correspondence model of peridynamics

Technical Presentation. IMECE2018-89917

**Masoud Behzadinasab**, *University of Teas at Austin, Austin, TX, United States*, **John Foster**, *The University of Texas At Austin, Austin, TX, United States*

#### 5:05pm Consistent Strong Enforcement of Essential Boundary Conditions in Meshfree Methods

Technical Presentation. IMECE2018-89937

**Kuan-Chung Lin**, *The Pennsylvania State University, state college, PA, United States*, **Michael Hillman**, *Pennsylvania State University, University Park, PA, United States*

## 12-19 COMPUTATIONAL FLUID-STRUCTURE INTERACTION

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### 12-19-3 Computational Fluid-Structure Interaction

Room 338 3:45pm - 5:30pm

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Session Chair: **Artem Korobenko**, *University of Calgary, Calgary, AB, Canada*

#### 3:45pm A Corrected Point-particle Method for Simulation of Particle-laden Flows

Technical Presentation. IMECE2018-88559

**Mahdi Esmaily**, *Cornell University, Ithaca, NY, United States*, **Jeremy A. Horwitz**, *Stanford University, Stanford, CA, United States*

#### 4:06pm An Adaptive Robin Transmission Condition for Fluid-Structure Coupled Simulations

Technical Presentation. IMECE2018-89280

**Shunxiang Cao**, *Virginia Tech, Blacksburg, VA, United States*, **Alex Main**, *Duke University, Durham, NC, United States*, **Kevin G. Wang**, *Virginia Tech, Blacksburg, VA, United States*

#### 4:27pm Partitioned Coupling Method between Three-Dimensional Heat Conduction Analysis and One-Dimensional Analysis of Cooling Pipe Model

Technical Presentation. IMECE2018-88979

**Naoto Mitsume, Tomonori Yamada, Shinobu Yoshimura**, *The University of Tokyo, Tokyo, Japan*

#### 4:48pm Computational Fluid Structure Interaction Simulation and Validation of Crossflow through a Tube Bundle

Technical Presentation. IMECE2018-89759

**Landon Brockmeyer**, *Texas A&M University Department of Nuclear Engineering, College Station, TX, United States*, **Elia Merzari**, *Argonne National Laboratory, Lemont, IL, United States*, **Jerome Solberg**, *LLNL, Livermore, CA, United States*, **Yassin Hassan**, *Texas A&M University, College Station, TX, United States*

#### 5:09pm Fluid-structure interactions using an immersed boundary method and turbulence generator

Technical Presentation. IMECE2018-89305

**Szymon Mijendereski, Jae Sung Park**, *University of Nebraska-Lincoln, Lincoln, NE, United States*

## 12-22 DEFORMATION AND FAILURE OF MULTIFUNCTIONAL MATERIALS

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### 12-22-2 Deformation and Failure of Multifunctional Materials

Fourth Floor, David L. Lawrence Convention Center, Room 405 3:45pm - 5:30pm

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Session Chair: **Russell Mailen**, *Auburn University, Auburn, AL, United States*

#### 3:45pm Mechanics of Fracture in Lithium-Ion Storage Materials

Technical Presentation. IMECE2018-89837

**Xueju Wang**, *University of Missouri, Columbia, MO, United States*, **Min Zhou, Shuman Xia**, *Georgia Institute of Technology, Atlanta, GA, United States*

**4:06pm** Design and Characteristic Analysis of Amalgamated Transparent Materials for Armor Structures Using Defeating Ballistic Experimentation

Technical Paper Publication. IMECE2018-86122

*Emad Attalla*, Lawrence Technological University, Southfield, MI, United States, *Steven Grate*, AM General LLC, Auburn Hills, MI, United States, *Badih Jawad*, Lawrence Technological University, Dearborn Heights, MI, United States, *Vernon Fernandez*, Lawrence Technological Univ, Southfield, MI, United States, *Sabah Abro*, *Liping Liu*, Lawrence Technological University, Southfield, MI, United States

**4:27pm** Experimental Determination of Crack Growth Rates during Actuation of NiTi and NiTiHf Shape Memory Alloys

Technical Presentation. IMECE2018-89010

*Ceylan Hayrettin*, *Benjamin Young*, Texas A&M University, College Station, TX, United States, *Theocharis Baxevanis*, University of Houston, Houston, TX, United States, *Ibrahim Karaman*, Texas A & M Univ, College Station, TX, United States, *Dimitris Lagoudas*, Texas A&M Univ, College Station, TX, United States

**4:48pm** Failure Mechanism of Cementitious Nanocomposites Reinforced by Multi-Walled and Single-Walled Carbon Nanotubes Under Splitting Tensile Test

Technical Paper Publication. IMECE2018-88512

*Robabeh Jazaei*, *Moses Karakouzian*, University of Nevada, Las Vegas, Las Vegas, NV, United States, *Brendan O'Toole*, University of Nevada Las Vegas, Las Vegas, NV, United States, *Jaeyun Moon*, *Samad Gharehdaghi*, University of Nevada, Las Vegas, Las Vegas, NV, United States

## 12-28 INSTABILITIES IN SOLIDS AND STRUCTURES

**12-28-3 Instabilities in Solids and Structures: Active and Soft Materials**

**Third Floor, David L. Lawrence Convention Center, Room 334 3:45pm - 5:30pm**

Session Chair: *Stelios Kyriakides*, Univ Of Texas, Austin, TX, United States

Session Co-Chair: *Dai Okumura*, Nagoya University, Nagoya, Japan

**3:45pm** Swelling-induced strain softening of swollen elastomers

Technical Presentation. IMECE2018-89159

*Dai Okumura*, Nagoya University, Nagoya, Japan

**4:06pm** Nonlinear Electroelastic Deformations of Soft Layered Composites Containing Space Charges, with Application to Electrets

Technical Presentation. IMECE2018-89237

*Victor Lefevre*, Northwestern University, Evanston, IL, United States, *Oscar Lopez-Pamies*, University of Illinois at Urbana-Champaign, Urbana, IL, United States

**4:27pm** Bifurcation analysis of twisted liquid crystal bilayers

Technical Presentation. IMECE2018-89046

*Dipayan Mukherjee*, Ecole Polytechnique, CNRS, Palaiseau, Ile-de-France, France, *Kostas Danas*, LMS, CNRS, Ecole Polytechnique, Palaiseau, Ile-de-france, France, *Nicolas Triantafylidis*, Ecole Polytechnique, Palaiseau, France

**4:48pm** Rayleigh-Taylor instability in a confined elastic soft cylinder

Technical Presentation. IMECE2018-89162

*Yue Zheng*, *Shengqiang Cai*, UC San Diego, La Jolla, CA, United States

**5:09pm** Freestanding 3D Mesostructures and Functional Devices based on Mechanically Induced Assembly of Shape Memory Polymers

Technical Presentation. IMECE2018-89948

*Xueju Wang*, University of Missouri, Columbia, MO, United States, *Xiaogang Guo*, Tsinghua University, Beijing, Select State/Province, China, *Yonggang Huang*, Northwestern Univ, Evanston, IL, United States, *Yihui Zhang*, Tsinghua University, Beijing, Select State/Province, China, *John Rogers*, Northwestern University, Evanston, IL, United States

## 12-35 CONGRESS-WIDE SYMPOSIUM ON NDE & SHM - ACTIVE AND PASSIVE HEALTH MONITORING OF STRUCTURES.

**12-35-1 Congress-Wide Symposium on NDE & SHM - Active and Passive Health Monitoring of Structures.**

**Room 331 3:45pm - 5:30pm**

Session Chair: *Sridhar Santhanam*, Villanova University, Collegeville, PA, United States

**3:45pm** Acoustic Emission Low-Temperature Performance Grade Evaluation of Asphalt Roadways Materials

Technical Paper Publication. IMECE2018-86067

*Lihui Sun*, University of Illinois at Urbana-Champaign, Urbana, IL, United States, *Behzad Behnia*, Clarkson University, New York, NY, United States, *William Buttlar*, University of Missouri, Columbia, MO, United States, *Henrique Reis*, University of Illinois at Urbana-Champaign, Urbana, IL, United States

**4:06pm** Amplitude and Sweeping Direction Dependent Nonlinear Ultrasonic Resonance Spectroscopy for Fatigue Crack Detection

Technical Paper Publication. IMECE2018-86221

*Yanfeng Shen*, *Nipon Roy*, *Junzhen Wang*, *Zixuan Liu*, *Danyu Rao*, *Wu Xu*, Shanghai Jiao Tong University, Shanghai, China

**4:27pm** Improved Nonlinear Ultrasonic Guided Wave Damage Detection Using a Bandgap Meta-Surface

Technical Paper Publication. IMECE2018-86222

*Yiran Tian*, *Yanfeng Shen*, Shanghai Jiao Tong University, Shanghai, China

Draft Program

**4:48pm**      **Coupling Behaviors in Remotely Bonded Fiber Bragg Grating Sensors for Lamb Wave Detection**

**Technical Presentation.** IMECE2018-87972

*Junghyun Wee, North Carolina State University, Raleigh, NC, United States, Drew Hackney, NCSU, Raleigh, NC, United States, Kara Peters, North Carolina State University, Raleigh, NC, United States*

**5:09pm**      **Acoustoelastic Dispersion Curves For Lamb Waves In The Presence Of Stress Gradients**

**Technical Presentation.** IMECE2018-89278

*Kranthi Prakash Peddetti, FLSmidth Inc / Villanova University, Bethlehem, PA, United States, Sridhar Santhanam, Villanova University, Collegeville, PA, United States*

## **12-36 KEYNOTE LECTURES ON COMPUTATIONAL MECHANICS**

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**12-36-2 Keynote Lectures on Computational Mechanics - 2**

**Fourth Floor, David L. Lawrence Convention Center, Room 402      3:45pm - 5:30pm**

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Session Chair: **Ashfaq Adnan**, *University of Texas Arlington, Arlington, TX, United States*

Session Co-Chair: **Caglar Oskay**, *Vanderbilt University, Nashville, TN, United States*

**3:45pm**      **Efficient Iterative Solvers for Multiscale and Multiphysics Problems**

**Invited Presentation.** IMECE2018-88875

*Suvranu De, Rensselaer Polytechnic Institute, Troy, NY, United States*

**4:27pm**      **Dynamic Fracture of Metals: a Unified Modeling Approach**

**Invited Presentation.** IMECE2018-88904

*Haim Waisman, Columbia University, New York, NY, United States*

**5:09pm**      **Advances in multiscale and multiphysics methods**

**Technical Presentation.** IMECE2018-88907

*Qian Qian, University of Texas at Dallas, Richardson, TX, United States*

## **12-38 YOUNG MEDALIST SYMPOSIUM**

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**12-38-2 Young Medalist Symposium**

**Fourth Floor, David L. Lawrence Convention Center, Room 401      3:45pm - 5:30pm**

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Session Chair: **Dennis Kochmann**, *ETH Zurich, Zurich, Switzerland*

**3:45pm**      **Morphable 3D Mesostructures and Micro-electronic Devices by Multistable Buckling Mechanics**

**Technical Presentation.** IMECE2018-89279

*Yihui Zhang, Tsinghua University, Beijing, China*

**4:06pm**      **Structural and microstructural influence on deformation and fracture of dual-phase steels**

**Technical Presentation.** IMECE2018-89288

*Xinzhu Zheng, Texas A&M University, College Station, TX, United States, Shmuel Osovski, Technion ? Israeli Institute of Technology, Haifa, Israel, Ankit Srivastava, Texas A&M University, College Station, TX, United States*

**4:27pm**      **Combining high-stiffness and high-damping in ceramics via the domain switching mechanism in ferroelectrics**

**Technical Presentation.** IMECE2018-89771

*Charles Wojnar, Missouri S&T, Rolla, MO, United States*

## **TUESDAY, NOVEMBER, 13**

### **12-40 PLENARY**

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**12-40-1 Mechanics of Solids, Structures and Fluids Plenary I**

**Third Floor, David L. Lawrence Convention Center, Room 308      8:00am - 8:45am**

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**8:00am**      **The Isogeometric Approach to Analysis**

**Plenary Presentation.** IMECE2018-90104

*Thomas Hughes, Jr., UT Austin, Austin, TX, United States*

### **12-40 PLENARY**

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**12-40-2 Mechanics of Solids, Structures and Fluids Plenary II**

**Third Floor, David L. Lawrence Convention Center, Room 308      9:00am - 9:45am**

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**9:00am**      **How to Design Quasibrittle and Lamellar Biomimetic Structures for Failure Probability Plenary Presentation.** IMECE2018-90105

*Zdenek Bazant, Northwestern Univ, Evanston, IL, United States*

### **12-1 MECHANICS OF SOFT MATERIALS**

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**12-1-4 Mechanics of Soft Materials: Constitutive Modeling**

**Third Floor, David L. Lawrence Convention Center, Room 336      10:00am - 11:45am**

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Session Chair: **Qiming Wang**, *University of Southern California, Los Angeles, CA, United States*

**Draft Program**

**10:00am** **Conjugate Stress/Strain Pair Approach for Anisotropic Materials**  
Technical Presentation. IMECE2018-87172  
*Alan Freed, Texas A&M, College Station, TX, United States, Veysel EREL, Mingliang Jiang, Texas A&M University, College Station, TX, United States*

**10:21am** **A Generalized Approach to Improve Approximation of Inverse Langevin Function**  
Technical Paper Publication. IMECE2018-88228  
*Vahid Morovati, Roozbeh Dargazany, Hamid Mohammadi, Michigan state university, EAST LANSING, MI, United States*

**10:42am** **An Improved Non-Gaussian Statistical Theory of Rubber Elasticity for Short Chains**  
Technical Paper Publication. IMECE2018-88234  
*Vahid Morovati, Roozbeh Dargazany, Michigan state university, EAST LANSING, MI, United States*

**11:03am** **Modeling Tensile-Torsion Response of Double Twisted Helical Yarns**  
Technical Paper Publication. IMECE2018-88265  
*Roozbeh Dargazany, Michigan State University, East Lansing, MI, United States, Jiaqi Lin, Massachusetts Institute of Technology, Cambridge, MI, United States, Hamid Mohammadi, Vahid Morovati, Michigan State University, East Lansing, MI, United States*

**11:24am** **Micromechanics to Macroscale Constitutive Modeling of Flexible Foams**  
Technical Presentation. IMECE2018-89349  
*Kevin Long, Dan Bolintineanu, Charlotte L.B. Kramer, Robert Waymel, Sandia National Laboratories, Albuquerque, NM, United States, Enrico Quintana, Sandia National Laboratories, Albuquerque, NM, United States, Michael Nissen, Sandia National Laboratories, Lawrence, KS, United States*

## **12-8 MULTI-SCALE COMPUTATIONS IN FLUIDS, STRUCTURES, AND MATERIALS**

### **12-8-1 Multi-Scale Computations in Fluids, Structures, and Materials 1**

**Fourth Floor, David L. Lawrence Convention Center, Room 401 10:00am - 11:45am**

Session Chair: *Yozo Mikata, Bechtel, Niskayuna, NY, United States*  
Session Co-Chair: *Glaucio Paulino, Univ Of Illinois, Urbana, IL, United States, Karel Matou?, University of Notre Dame, Notre Dame, IN, United States*

**10:00am** **Fatigue Crack Propagation for Semi-Elliptical Cracks**  
Technical Presentation. IMECE2018-87188  
*Yozo Mikata, Bechtel, Niskayuna, NY, United States*

**10:21am** **Multiresolution Modeling and Error Control with an Adaptive Wavelet Algorithm**  
Technical Presentation. IMECE2018-88577  
*Cale Harnish, Karel Matou?, University of Notre Dame, Notre Dame, IN, United States, Daniel Livescu, Los Alamos National Lab, Los Alamos, NM, United States*

**10:42am** **Computational Mechanics of the Size Effects and Shearbands Based on Coupled Thermo-mechanical Strain Gradient Plasticity Framework**  
Technical Presentation. IMECE2018-87095  
*George Voyiadjis, Louisiana State Univ, Baton Rouge, LA, United States, Yoosob Song, Louisiana State University, Baton Rouge, LA, United States*

**11:03am** **Simultaneous Spatial and Temporal Coarse-graining: from Particle Dynamics to Continuum Thermoelasticity**  
Technical Presentation. IMECE2018-89482  
*Celia Reina, Xiaoguai Li, University of Pennsylvania, Philadelphia, PA, United States*

**11:24am** **Supercoiling of Kirchhoff Rods under Continuously Distributed Electrostatic Charge and its Application to DNA**  
Technical Presentation. IMECE2018-89277  
*Raushan Singh, Ajeet Kumar, IIT Delhi, India, New Delhi, Delhi, India*

## **12-10 MODELING AND EXPERIMENTS IN NANOMECHANICS AND NANOMATERIALS**

### **12-10-4 Modeling and Experiments in Nanomechanics and Nanomaterials 4**

**Third Floor, David L. Lawrence Convention Center, Room 335 10:00am - 11:45am**

Session Chair: *Yozo Mikata, Bechtel, Niskayuna, NY, United States*  
Session Co-Chair: *Jenrey Kysar, Columbia University, New York, NY, United States, Ryan Elliott, University of Minnesota, Saint Paul, MN, United States, Yashashree Kulkarni, University of Houston, Houston, TX, United States*

**10:00am** **Mechanical Properties of P3HT:P-CBM Bulk-heterojunction Thin Films by Coarse-Grained Molecular Dynamics**  
Technical Presentation. IMECE2018-86446  
*Joydeep Munshi, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States*

**10:21am** **Effect of Size and Crystallography in SiC nanowire**  
Technical Presentation. IMECE2018-89979  
*Fazle Elahi, Md Hossain, University of Delaware, Newark, DE, United States*

**10:42am** **Crack deflection-penetration at a nanoscale interface of graphene/hBN heterostructure**  
Technical Presentation. IMECE2018-89981  
*Tousif Ahmed, Md Hossain, University of Delaware, Newark, DE, United States*

**11:03am** **2D Crystallization of Poly(vinyl alcohol) Monolayer on Graphene Oxide (GO) and its Role in Improving Interfacial Shear Strength in GO at different temperature**

**Technical Presentation.** IMECE2018-89996

*Wei Gao, The University of Texas at San Antonio, San Antonio, TX, United States, Arman Ghasemi, University of Texas At San Antonio, San Antonio, TX, United States*

**11:24am** **In silico preparation and mesoscopic modelling of carbon nanotube thin films with covalent cross-links**

**Technical Presentation.** IMECE2018-87658

*Alexey Volkov, University of Alabama, Tuscaloosa, AL, United States, Md Abu Horaira Banna, The University of Alabama, Tuscaloosa, AL, United States*

## **12-12 MECHANICS OF THIN-FILM AND MULTI-LAYER STRUCTURES**

**12-12-1 Mechanics of Thin-Film and Multi-Layer Structures**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 10:00am - 11:45am**

Session Chair: **Shuodao Wang, Oklahoma State Univ, Stillwater, OK, United States**

**10:00am** **Buckling of a stiff thin film on an elastic graded compliant substrate**

**Technical Presentation.** IMECE2018-92272

*Jizhou Song, Zhejiang University, Hangzhou, Zhejiang, China*

**10:21am** **Wrinkling and cracking/folding for multiscale hierarchical surface morphologies**

**Technical Presentation.** IMECE2018-89524

*Jianliang Xiao, University of Colorado Boulder, Boulder, CO, United States*

**10:42am** **On Bistability of a Plate Driven by Geometric Asymmetry**

**Technical Presentation.** IMECE2018-89980

*Guangchao Wan, Dartmouth College, Hanover, NH, United States, Qiaohang Guo, Fujian University of Technology, Fuzhou, Select State/Province, China, Xiaomin Han, Shicheng Huang, Zi Chen, Dartmouth College, Hanover, NH, United States*

**11:03am** **Spontaneous Buckling-driven Periodic Delamination of Thin Films on Soft Substrates under Large Compression**

**Technical Presentation.** IMECE2018-89248

*Qiuting Zhang, Temple University, Philadelphia, PA, United States, Jie Yin, Temple U, Haverford, PA, United States*

**11:24am** **Understanding the Bending Behaviors of Multilayer 2D Materials**

**Technical Presentation.** IMECE2018-89090

*Zhaohu Dai, Nanshu Lu, University of Texas at Austin, Austin, TX, United States*

## **12-19 COMPUTATIONAL FLUID-STRUCTURE INTERACTION**

**12-19-4 Computational Fluid-Structure Interaction**

**Fourth Floor, David L. Lawrence Convention Center, Room 402 10:00am - 11:45am**

Session Chair: **Artem Korobenko, University of Calgary, Calgary, AB, Canada**

**10:00am** **Isogeometric analysis of thermal multi-phase flows and its applications to bubble dynamics and manufacturing processes**

**Technical Presentation.** IMECE2018-89506

*Jinhui Yan, University of Illinois at Urbana-Champaign, Champaign, IL, United States*

**10:21am** **Analysis of the Fluid Motion Induced by a Vibrating Lamina Through Free Surface-Lattice Boltzmann Coupled Method**

**Technical Paper Publication.** IMECE2018-87715

*Daniele Chiappini, Giovanni Di Ilio, University of Rome Niccolò Cusano, Rome, Rome, Italy, Gino Bella, University of Rome Tor Vergata, Rome, Rome, Italy*

**10:42am** **Study On Acoustic Phenomena Of Drop Impact On Elastic Wall**

**Technical Presentation.** IMECE2018-88974

*Wen Cheng, Beijing Institute of Technology, Beijing, China*

**11:03am** **Universal Modeling and Approximation of an Coupling Lamb Wave Propagation With Fluid-Structure Interaction Problem**

**Technical Paper Publication.** IMECE2018-87448

*Bhuiyan Shameem Mahmood Ebna Hai, Markus Bause, Helmut Schmidt University, Hamburg, Germany*

**11:24am** **Wind Turbine Tower Inspection Improvement and Fatigue Analysis**

**Technical Presentation.** IMECE2018-89071

*Afshin H. Zahraee, Purdue University Northwest, Chicago, IL, United States*

## **12-28 INSTABILITIES IN SOLIDS AND STRUCTURES**

**12-28-4 Instabilities in Solids and Structures: Stability of Composites, Foams/Open-cell materials**

**Room 338 10:00am - 11:45am**

Session Chair: **Victor Lefevre, Northwestern University, Evanston, IL, United States**

Session Co-Chair: **George Kardomateas, Georgia Institute of Technology, Alpharetta, GA, United States**

**10:00am** **Nonlinear High Order Analysis for the Buckling and Post-buckling Behavior of Sandwich Composites**

**Technical Presentation.** IMECE2018-89711

*Zhangxian Yuan, Georgia Inst of Technology, Atlanta, GA, United States, George Kardomateas, Georgia Institute of Technology, Alpharetta, GA, United States*

**10:21am Numerical Modeling of Multiaxial Crushing of Open-Cell Foams**

Technical Presentation. IMECE2018-89131

*Chenglin Yang, University of Texas at Austin, Austin, TX, United States, Stelios Kyriakides, Univ Of Texas, Austin, TX, United States*

**10:42am Mechanics of Brittle Foams**

Technical Presentation. IMECE2018-89735

*Sirui Bi, Johns Hopkins, Baltimore, MD, United States, Stavros Gaitanaros, Johns Hopkins University, Baltimore, MD, United States*

**11:03am Macroscopic Instabilities and Domain Formation in Neo-Hookean Laminates**

Technical Presentation. IMECE2018-89307

*Joshua Furer, Pedro Ponte Castañeda, University of Pennsylvania, Philadelphia, PA, United States*

**11:24am Breaking Symmetry in Externally Pressurized Spherical Shells for Imperfection-Insensitive Designs**

Technical Presentation. IMECE2018-89888

*Xin Ning, The Pennsylvania State University, Urbana, IL, United States*

**12-39 DRUCKER MEDAL SYMPOSIUM**

**12-39-1 Drucker Medal Symposium**

Fourth Floor, David L. Lawrence Convention Center, Room 403 10:00am - 1:45pm

Session Chair: *Wei Cai, Stanford University, Stanford, CA, United States*

**10:00am Properties of the Eshelby Tensor and Existence of the Equivalent Ellipsoidal Inclusion Solution**

Technical Presentation. IMECE2018-89382

*Wei Cai, Stanford University, Stanford, CA, United States, David Barnett, Stanford Univ, Sunnyvale, CA, United States*

**10:21am Liquid Inclusions in Soft Materials: Capillary Effect, Mechanical Stiffening and Enhanced Electro-mechanical Response**

Technical Presentation. IMECE2018-89074

*Sana Krichen, University of Houston, Houston, TX, United States, Liping Liu, Rutgers University, Piscataway, TX, United States, Pradeep Sharma, University of Houston, Houston, TX, United States*

**10:42am The Waves of Phase Change**

Technical Presentation. IMECE2018-89061

*Xanthippi Markenscoff, University of California, San Diego, La Jolla, CA, United States*

**11:03am A piezoelectric inclusion of arbitrary shape with weakly and highly conducting imperfect interface**

Technical Presentation. IMECE2018-89865

*Les Sudak, University of Calgary, Calgary, AB, Canada, Daniel McArthur, Becht Engineering, Calgary, AB, Canada*

**11:24am Discrete shear transformation zone (STZ) plasticity**

Technical Presentation. IMECE2018-89101

*Alan Needleman, Babak Kondori, Manish Vasoya, Texas A&M University, College Station, TX, United States, Ahmed Amine Benzerga, Texas A&M Univ, College Station, TX, United States*

**12-1 MECHANICS OF SOFT MATERIALS**

**12-1-5 Mechanics of Soft Materials: Bioinspiration and Biomimetics**

Third Floor, David L. Lawrence Convention Center, Room 336 1:45pm - 3:30pm

Session Chair: *Sung Kang, Johns Hopkins University, Baltimore, MD, United States*

**1:45pm Slack Lengths of the Bands of the Medial Ulnar Collateral Ligament: Experiment & Model**

Technical Presentation. IMECE2018-87494

*David Jordan, Mark Carl Miller, University of Pittsburgh, Pittsburgh, PA, United States, Alexander Kharlamov, Allegheny General Hospital, Pittsburgh, PA, United States*

**2:06pm Understanding the tunable adhesion of wrinkled surfaces via a lattice model**

Technical Presentation. IMECE2018-87812

*Teng Zhang, Syracuse university, Syracuse, NY, United States*

**2:27pm Bioinspired Materials with Self-Adaptable Mechanical Properties and Self-Regeneration by Coupling Mechanics and Chemistry Using Soft Stimuli-Responsive Scaffolds**

Technical Presentation. IMECE2018-89038

*Santiago Orrego, Urszula Krekora, Decheng Hou, Zhezhi Chen, Eugene Kang, Sung Kang, Johns Hopkins University, Baltimore, MD, United States*

**2:48pm Elasticity As The Basis Of Allostery In DNA**

Technical Presentation. IMECE2018-89049

*Jaspreet Singh, University of Pennsylvania, Philadelphia., Philadelphia, PA, United States, Prashant K. Purohit, University of Pennsylvania, Philadelphia, PA, United States*

**3:09pm Nonlinear Elasticity of Scale Covered Biomechanical Substrate**

Technical Presentation. IMECE2018-89900

*Ranajay Ghosh, University of Central Florida, Orlando, FL, United States, Hossein Ebrahimi, University of Central Florida, Orlando, FL, United States, Hessein Ali, Ryan Horton, University of Central Florida, Orlando, FL, United States*

## **12-8 MULTI-SCALE COMPUTATIONS IN FLUIDS, STRUCTURES, AND MATERIALS**

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### **12-8-2 Multi-Scale Computations in Fluids, Structures, and Materials 2**

**Fourth Floor, David L. Lawrence Convention Center, Room 401 1:45pm - 3:30pm**

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Session Chair: **Yozo Mikata**, *Bechtel, Niskayuna, NY, United States*

Session Co-Chair: **Glaucio Paulino**, *Univ Of Illinois, Urbana, IL, United States*, **Yucheng Liu**, *Mississippi State University, Mississippi State, MS, United States*

#### **1:45pm SH-Waves in 1D Phononic Metamaterials**

**Technical Presentation.** IMECE2018-88301

**Yozo Mikata**, *Bechtel, Niskayuna, NY, United States*

#### **2:06pm Thermodynamically Consistent and Physically Motivated Finite Deformation Strain Gradient Plasticity Framework**

**Invited Presentation.** IMECE2018-89259

**George Voyiadjis**, *Louisiana State Univ, Baton Rouge, LA, United States*, **Yooseob Song**, *Louisiana State University, Baton Rouge, LA, United States*

#### **2:48pm Crystal Orientations Effects of Copper Single Crystals Simulated by LAMMPS Employing Modified Embedded Atomic Method**

**Technical Presentation.** IMECE2018-86284

**Yangqing Dou**, *Yucheng Liu*, *Mississippi State University, Mississippi State, MS, United States*, **Mark Horstemeyer**, *Mississippi State Univ, Starkville, MS, United States*

#### **3:09pm Quantification of Material degradation due to Voids and Fiber breakage in composite material**

**Technical Presentation.** IMECE2018-89503

**vahid tavaf**, **Mohammadsadegh Saadatzi**, **Sourav Banerjee**, *university of South Carolina, Columbia, SC, United States*

## **12-12 MECHANICS OF THIN-FILM AND MULTI-LAYER STRUCTURES**

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### **12-12-2 Mechanics of Thin-Film and Multi-Layer Structures**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 1:45pm - 3:30pm**

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Session Chair: **Shuodao Wang**, *Oklahoma State Univ, Stillwater, OK, United States*

#### **1:45pm Scaling Analyses for Mixed-Mode Transfer of 2D Materials**

**Technical Presentation.** IMECE2018-89425

**Shruti Jain**, *UT Austin, Austin, TX, United States*, **Roger Bon-necaze**, *The University of Texas at Austin, Austin, TX, United States*, **Kenneth Liechti**, *Univ Of Texas, Austin, TX, United States*

#### **2:06pm Modeling the Granular/Metal Multi-layered Structure of Lithium-ion Batteries**

**Technical Presentation.** IMECE2018-89467

**Juner Zhu**, *Massachusetts Institute of Technology, Cambridge, MA, United States*, **Wei Li**, *Tsinghua University, Beijing, Beijing, China*, **Tomasz Wierzbicki**, *MIT, Cambridge, MA, United States*

#### **2:27pm Thermal Shrinkage Behavior of Battery Separator**

**Technical Paper Publication.** IMECE2018-86621

**Shutian Yan**, *Michigan State University, East Lansing, MI, United States*, **Jie Deng**, **Chulheung Bae**, *Ford Motor Company, Dearborn, MI, United States*, **Xinran Xiao**, *Michigan State University, Lansing, MI, United States*

#### **2:48pm Measuring Adhesion between SiO<sub>2</sub> and 2D Titanium Carbides (MXenes)**

**Technical Presentation.** IMECE2018-89405

**Chenglin Wu**, **Yanxiao Li**, **Vadym Mochalin**, **Shuohan Huang**, *Missouri University of Science and Technology, Rolla, MO, United States*

#### **3:09pm Use of a Trilayer Shell Model to Determine Intrinsic Stress Within Titanium-Silicon Carbonitride Coating**

**Technical Paper Publication.** IMECE2018-87929

**Anurag Chakraborty**, *South Dakota School of Mines and Technology, Rapid City, SD, United States*, **Forest Thompson**, *South Dakota School of Mines & Technology, Rapid City, SD, United States*, **Jason Ash**, *South Dakota School of Mines and Technology, Rapid City, SD, United States*, **Phil Ahrenkiel**, **Frank Kustas**, **Robert Anderson**, *South Dakota School of Mines & Technology, Rapid City, SD, United States*

## **12-17 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING: FAILURE OF ADDITIVELY MANUFACTURED MATERIALS**

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### **12-17-1 Failure and Fracture of Additively Manufactured Materials and Structures - 1**

**Third Floor, David L. Lawrence Convention Center, Room 335 1:45pm - 3:30pm**

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Session Chair: **H. Eliot Fang**, *Sandia National Laboratories, Albuquerque, NM, United States*

Session Co-Chair: **Ashfaq Adnan**, *University of Texas Arlington, Arlington, TX, United States*

#### **1:45pm Deformation and Failure of an Additively Manufactured Casing with Optimized Graded Lattice Infills**

**Technical Presentation.** IMECE2018-89126

**Matthew Lynch**, *United Technologies Research Center, East Hartford, CT, United States*, **Lin Cheng**, **Albert To**, *University of Pittsburgh, Pittsburgh, PA, United States*

#### **2:06pm Deformation and Failure of an Additively Manufactured Casing with Optimized Graded Lattice Infills Part II**

**Technical Presentation.** IMECE2018-90000

**Matthew Lynch**, *United Technologies Research Center, East Hartford, CT, United States*, **Lin Cheng**, **Albert To**, *University of Pittsburgh, Pittsburgh, PA, United States*

**2:27pm** Topology Optimization Design of Transmission Structure in Flapping-wing Micro Aerial Vehicle via 3D Printing

Technical Presentation. IMECE2018-88787

*Zuyong Chen, Jianghao Wu, Beihang University, Beijing, Beijing, China*

**2:48pm** Predicting Performance and Failure in Additively Manufactured Stainless Steel Parts

Technical Presentation. IMECE2018-89336

*Kyle L. Johnson, John M. Emery, Chris I. Hammetter, Judith A. Brown, Spencer Grange, Kurtis R. Ford, Joseph Bishop, Sandia National Laboratories, Albuquerque, NM, United States*

**3:09pm** Prediction of Failure for Multi-Phase Composites Fabricated via Multi-Material 3D Printing

Technical Presentation. IMECE2018-90039

*Yaning Li, Lei Lui, Richard Nash, University of New Hampshire, Durham, NH, United States*

## **12-28 INSTABILITIES IN SOLIDS AND STRUCTURES**

**12-28-5 Instabilities in Solids and Structures: Phase Transformations/transitions and Multi-stability**

**Room 338 1:45pm - 3:30pm**

Session Chair: **Katia Bertoldi**, *Harvard University, Cambridge, MA, United States*

Session Co-Chair: **Hiro Tanaka**, *Osaka University, Osaka, Japan*

**1:45pm** Effect of Phase Transformation on the Stability of Pseudoelastic NiTi Tubes Under Bending

Technical Presentation. IMECE2018-90095

*Karlos Kazinakis, University of Texas at Austin, Austin, TX, United States, Stelios Kyriakides, Univ Of Texas, Austin, TX, United States, Chad Landis, The University Of Texas At Austin, Austin, TX, United States*

**2:06pm** Instability and Self-Folding of One-Dimensional Nanomaterials by Liquid Evaporation

Technical Presentation. IMECE2018-89107

*Qingchang Liu, University of Virginia, Charlottesville, VA, United States, Baoxing Xu, University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States*

**2:27pm** Propagation of non-linear waves in 2D mechanical metamaterials based on bistable shallow arches

Technical Presentation. IMECE2018-89431

*Gabriele Librandi, Harvard University, Cambridge, MA, United States, Eleonora Tubaldi, University of Arizona, Tucson, AZ, United States, Katia Bertoldi, Harvard University, Cambridge, MA, United States*

**2:48pm** Elastic and Viscoelastic Transition Responses of Specific Repetitive Structural Systems Subjected to Uniaxial Compressive Loading

Technical Presentation. IMECE2018-88760

*Hiro Tanaka, Kazutoshi Hamada, Osaka University, Osaka, Japan, Gakuto Yamanokuchi, Osaka Univ., Suita, Osaka, Japan, Yoji Shibutani, Osaka Univ, Osaka, Japan*

## **12-31 MECHANICAL METAMATERIALS**

**12-31-1 Design of Mechanical Metamaterials**

**Fourth Floor, David L. Lawrence Convention Center, Room 402 1:45pm - 3:30pm**

Session Chair: **Jongmin Shim**, *University at Buffalo, Buffalo, NY, United States*

Session Co-Chair: **Jie Yin**, *Temple U, Haverford, PA, United States*

**1:45pm** Computational design of multistable prismatic architected materials

Invited Presentation. IMECE2018-89021

*Johannes T.B. Overvelde, Agustin Iniguez-Rabago, AMOLF, Amsterdam, Netherlands*

**2:27pm** Accelerated search and design for stretchable graphene kirigami using machine learning

Technical Presentation. IMECE2018-88956

*Harold Park, Boston University, Brookline, MA, United States, Paul Hanakata, Boston University, Boston, MA, United States, Ekin Cubuk, Google Brain, Mountain View, CA, United States, David Campbell, Boston University, Boston, MA, United States*

**2:48pm** Heterogeneously Architected Meta-structures by Mechanics Design

Technical Presentation. IMECE2018-89033

*Baoxing Xu, University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States*

**2:06pm** 3D Construction of a Tilted Cuboid Mechanical Metamaterial

Technical Paper Publication. IMECE2018-87050

*Yunfang Tang, Zhong You, University of Oxford, Oxford, United Kingdom*

## **12-39 DRUCKER MEDAL SYMPOSIUM**

**12-39-2 Drucker Medal Symposium**

**Fourth Floor, David L. Lawrence Convention Center, Room 403 1:45pm - 3:30pm**

Session Chair: **Wei Cai**, *Stanford University, Stanford, CA, United States*

**1:45pm** Is There a Universal Exponent for the Activation Energy of Dislocation Nucleation?

Technical Presentation. IMECE2018-89587

*Christopher Weinberger, Anik H M Faisal, Colorado State University, Fort Collins, CO, United States*

**2:06pm** A Phase Field Model for Brittle Fracture Based on Homogenization

Technical Presentation. IMECE2018-89188

*Yongxing Shen, Cheng Cheng, Shanghai Jiao Tong University, Shanghai, China*

**2:27pm** Architecture in biological materials: a template for toughness enhancement, or a siren song?

Technical Presentation. IMECE2018-89885

*Haneesh Kesari, Brown University, Providence, RI, United States*

**2:48pm** Dislocation Dynamics Simulations of Materials with Complex Physics

Technical Presentation. IMECE2018-89319

*Sylvie Aubry, Lawrence Livermore National Laboratory, Livermore, CA, United States*

**3:09pm** Probing defect-controlled plasticity at small scale via multiscale discrete defect element method

Technical Presentation. IMECE2018-89502

*Ill Ryu, University of Texas at Dallas, Richardson, TX, United States, Taejoon Park, The Ohio State University, Columbus, OH, United States, Cuong Nguyen, The University of Texas at Dallas, Richardson, TX, United States, Farhang Pournaghbat, The Ohio State University, Columbus, OH, United States*

## **12-1 MECHANICS OF SOFT MATERIALS**

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**12-1-6 Mechanics of Soft Materials: Electro/magneto/chemo-mechanics**

**Third Floor, David L. Lawrence Convention Center, Room 336 3:45pm - 5:30pm**

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Session Chair: **Robert L. Lowe, University of Dayton, Dayton, OH, United States**

**3:45pm** The effect of Terfenol-D particles on the electroactive properties of PVDF-TrFE composites

Technical Presentation. IMECE2018-89969

*Scott Newacheck, George Youssef, San Diego State University, San Diego, CA, United States*

**4:00pm** Micro-Mechanical Model for Thermo-Oxidative Aging of Elastomers

Technical Paper Publication. IMECE2018-88109

*Hamid Mohammadi, Roozbeh Dargazany, Michigan State University, East Lansing, MI, United States*

**4:15pm** Chemo-mechanically coupled constitutive model for high temperature oxidation in polymers

Technical Presentation. IMECE2018-89009

*Shabnam Konica, Trisha Sain, Michigan Technological University, Houghton, MI, United States*

**4:30pm** Adaptable Liquid Crystal Elastomers with Transesterification-Based Bond Exchange Reactions

Technical Presentation. IMECE2018-89235

*Kai Yu, University of Colorado - Denver, Denver, CO, United States*

**4:45pm** Large-Strain Constitutive Modeling of Soft Multiferroic Magnetoelectric Materials

Technical Presentation. IMECE2018-89583

*Robert L. Lowe, Hafez Tari, University of Dayton, Dayton, OH, United States*

**5:00pm** Modeling Hysteresis in Magneto/Electro-Active, Soft Elastomeric, and Shape Memory Materials

Technical Presentation. IMECE2018-89647

*Hafez Tari, University of Dayton, Dayton, OH, United States*

## **12-8 MULTI-SCALE COMPUTATIONS IN FLUIDS, STRUCTURES, AND MATERIALS**

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**12-8-3 Multi-Scale Computations in Fluids, Structures, and Materials 3**

**Fourth Floor, David L. Lawrence Convention Center, Room 401 3:45pm - 5:30pm**

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Session Chair: **Yozo Mikata, Bechtel, Niskayuna, NY, United States**

Session Co-Chair: **Glaucio Paulino, Univ Of Illinois, Urbana, IL, United States, Huijuan Zhao, Clemson University, Clemson, SC, United States, Ahmad Najafi, Drexel University, Philadelphia, PA, United States**

**3:45pm** Multi-scale Design of Periodic Nonlinear Materials Using a Gradient-Based Shape Optimization

Technical Presentation. IMECE2018-88080

*Ahmad Najafi, Drexel University, Philadelphia, PA, United States, Masoud Safdari, University of Illinois at Urbana-Champaign, Champaign, IL, United States*

**4:06pm** Constructal approach for stability analysis of initially twisted beam under distributed follower forces

Technical Presentation. IMECE2018-88020

*Shanae Powell, Ehsan Izadpanahi, Florida International University, Miami, FL, United States, Siavash Rastkar, FIU, Miami, FL, United States, Pezhman Mardanpour, Florida International University, Weston, FL, United States*

**4:20pm** Analysis of parametric uncertainty and sensitivity in multi-scale modeling of shock response of a pressed energetic material

Technical Presentation. IMECE2018-89057

*Sangyup Lee, Oishik Sen, Nirmal Kumar Rai, University of Iowa, Iowa City, IA, United States, HS Udaykumar, The University of Iowa, Iowa City, IA, United States*

**4:48pm** Molecular Dynamics Simulation on Fused Silica under Shock Impact

Technical Presentation. IMECE2018-89569

*Huijuan Zhao, Clemson University, Clemson, SC, United States*

**5:09pm** Development and computational analysis evaluation of miscible fluids into a flow mixer

Technical Presentation. IMECE2018-89048

*Jeniffer A. M. Lopes, Altibano Ortenzi, Londrina State University, Londrina, Paraná, Brazil*

## **12-12 MECHANICS OF THIN-FILM AND MULTI-LAYER STRUCTURES**

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**12-12-3 Mechanics of Thin-Film and Multi-Layer Structures**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 3:45pm - 5:30pm**

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Session Chair: **Shuodao Wang, Oklahoma State Univ, Stillwater, OK, United States**

**3:45pm Composite Fabric Blankets for Plastic Gears**  
**Technical Paper Publication.** IMECE2018-86074  
*Hany Ghoneim, Alfonso Fuentes-Aznar, Sachin Kini, Rochester Institute of Technology, Rochester, NY, United States*

**4:00pm Vacancy Engineering and Phase Transformation in Zirconium Thin Films**  
**Technical Presentation.** IMECE2018-86351  
*Zahabul Islam, Baoming Wang, The Pennsylvania State University, State College, PA, United States, Md Haque, Penn State University, University Park, PA, United States*

**4:15pm Numerical prediction of Fatigue life of composite hybrid joint**  
**Technical Presentation.** IMECE2018-89913  
*Shah Alam, Texas A&M University-Kingsville, Kingsville, TX, United States, Vishveshwara Chitturi, Texas A&M University - Kingsville, Kingsville, TX, United States*

**4:30pm Indentation-Induced Deformation and Damage in Metal-Ceramic Multilayer Thin Films**  
**Technical Presentation.** IMECE2018-86239  
*Yu-Lin Shen, Univ of New Mexico, Albuquerque, NM, United States*

**4:45pm Experimental Research on Tensile and Tearing of Thin-Wall Polymer Scraps of End-of-Life Vehicles and Household Appliances**  
**Technical Paper Publication.** IMECE2018-86036  
*Jianxiong Liu, National Engineering Research Center of Waste Resource Recovery of KMUST, Kunming, Yunnan, China, Anmin Chang, Valmont Industries(China) Ltd, Shanghai, Shanghai, China, Wei Liu, Kunming University of Science and Technology, Kunming, Yunnan, China*

**5:00pm Finite Element Simulation of Cracks Propagation in Rolling Contact Applications With and Without Coating Applied in Industrial Field**  
**Technical Paper Publication.** IMECE2018-86308  
*Monzer Al Esber, University of Balamand, Tripoli, Lebanon North, Lebanon, Gabi Nehme, University of Balamand, El-Koura, Lebanon North, Lebanon*

## **12-13 RECENT ADVANCES AND APPLICATIONS IN MESHFREE AND PARTICLE METHODS**

**12-13-2 Recent Advances and Applications in Meshfree and Particle Methods**

**Room 338 3:45pm - 5:30pm**

Session Chair: **C.T. Wu**, LSTC, Livermore, CA, United States  
Session Co-Chair: **Michael Hillman**, Pennsylvania State University, University Park, PA, United States

**3:45pm Gradient Reproducing Kernel Collocation Method for High Order PDEs**  
**Technical Presentation.** IMECE2018-88725  
*Sheng-Wei Chi, Ashkan Mahdavi, University of Illinois at Chicago, Chicago, IL, United States*

**4:00pm A coupled immersed IGA-RKPM formulation for Air-Blast-Structure Interaction**  
**Technical Presentation.** IMECE2018-89855  
*Georgios Moutsanidis, UC San Diego, San Diego, CA, United States, Yuri Bazilevs, Brown university, Providence, RI, United States*

**4:15pm The Conforming Reproducing Kernel Method for an Agile Design-to-Simulation Workflow**  
**Technical Presentation.** IMECE2018-90041  
*Jacob Koester, Sandia National Laboratories, Albuquerque, NM, United States, Jiun-Shyan Chen, University of California, San Diego, La Jolla, CA, United States, Michael Tupek, Scott Mitchell, Joseph Bishop, Sandia National Laboratories, Albuquerque, NM, United States*

**4:30pm a conforming reproducing kernel finite volume method**  
**Technical Presentation.** IMECE2018-89884  
*Michael Hillman, Pennsylvania State University, University Park, PA, United States, Saily Yang, the Pennsylvania State University, STATE COLLEGE, PA, United States*

**4:45pm Advances in RVE Large Deformation Analysis of Heterogeneous Structures using an Immersed Particle Modeling Method and Mechanistic Machine Learning Technology**  
**Technical Presentation.** IMECE2018-88773  
*Zeliang Liu, C.T. Wu, LSTC, Livermore, CA, United States*

**5:00pm A comparison between ANCF and SPH methods for liquid sloshing problems**  
**Technical Presentation.** IMECE2018-89660  
*Mohammed Mujtaba Qureshi, Emanuele Grossi, University of Illinois at Chicago, Chicago, IL, United States*

## **12-17 CONGRESS-WIDE SYMPOSIUM ON ADDITIVE MANUFACTURING: FAILURE OF ADDITIVELY MANUFACTURED MATERIALS**

**12-17-2 Failure and Fracture of Additively Manufactured Materials and Structures - 2**

**Third Floor, David L. Lawrence Convention Center, Room 335 3:45pm - 5:30pm**

Session Chair: **Ashfaq Adnan**, University of Texas Arlington, Arlington, TX, United States  
Session Co-Chair: **H. Eliot Fang**, Sandia National Laboratories, Albuquerque, NM, United States

**3:45pm Role of Build Architecture and Loading Rate on Quasi-Static and Dynamic Fracture Behaviors of Additively Printed ABS Studied Using DIC**  
**Technical Presentation.** IMECE2018-87028  
*John P. Isaac, Auburn University, Auburn University, AL, United States, Hareesh Tippur, Auburn Univ, Auburn, AL, United States*

**4:06pm Characterizing the Increase In Inter-Bead Bond Strength Of FDM Parts Due To Thermal Annealing**  
**Technical Presentation.** IMECE2018-89193  
*Rhugdhriyva Rane, Robert M Taylor, University of Texas at Arlington, Arlington, TX, United States*

**4:27pm**      **AFM Analysis of Polybutadiene Distribution in the weld zones of FDM-printed ABS dogbones**  
Technical Presentation. IMECE2018-89732  
*David Collinson, Northwestern University, Evanston, IL, United States*

**4:48pm**      **ADDITIVE MANUFACTURING AND MECHANICAL PROPERTIES OF BONELIKE ULTRA-LIGHT NANOCOMPOSITE STRUCTURES**  
Technical Presentation. IMECE2018-89773  
*Sheikh Ferdous, University of Massachusetts Dartmouth, Dartmouth, MA, United States, Ashfaq Adnan, University of Texas Arlington, Arlington, TX, United States, Sushma Pothana, University of Texas at Arlington, Arlington, TX, United States*

**5:09pm**      **Thermal Modeling and Meltpool Monitoring of Laser Melting of SS 17-4 PH**  
Technical Presentation. IMECE2018-89960  
*Adrian Lew, Stanford Univ, Stanford, CA, United States*

## **12-31 MECHANICAL METAMATERIALS**

### **12-31-2 Functionality of Mechanical Metamaterials**

**Fourth Floor, David L. Lawrence Convention Center, Room 402      3:45pm - 5:30pm**

Session Chair: **Lifeng Wang**, *Stony Brook University, Stony Brook, NY, United States*

Session Co-Chair: **Jaehyung Ju**, *Shanghai Jiao Tong University, Shanghai, Select State/Province, China*

**3:45pm**      **An Origami-based Metamaterial with Programmable Multi-stability and Anisotropic Behavior**  
Technical Presentation. IMECE2018-87142  
*Soroush Kamrava, Northeastern University, Allston, MA, United States, Ashkan Vaziri, Northeastern University, Boston, MA, United States*

**4:06pm**      **Pseudo-bistable Mechanics Of 3D-printed Metastructures And Metamaterials With Snap-Through Instabilities**  
Technical Presentation. IMECE2018-89745  
*Julien Meaud, Kaikai Che, Georgia Institute of Technology, Atlanta, GA, United States*

**4:27pm**      **Temperature-triggered Metamaterial Platforms for Biomedical Applications**  
Technical Presentation. IMECE2018-89794  
*Sahab Babaee, Simo Pajovic, Ameya R. Kirtane, Jiuyun Shi, Kaitlyn Hess, Ester Caffarel-Salvador, Joy E. Collins, Siddhartha Tamang, Aniket V. Wahane, Alison M. Hayward, Hormoz Mazdiyasn, Giovanni Traverso, Robert Langer, MIT, Cambridge, MA, United States*

**4:48pm**      **Metabiomaterials Based on Minimal Surface Skeletal Nets**  
Technical Presentation. IMECE2018-89302  
*Sebastien Callens, Delft University of Technology, Delft, Netherlands, Amir Abbas Zadpoor, Delft University of Technology (TUDelft), Delft, Netherlands*

**5:09pm**      **Fabrication, characterization and mechanical behaviours of three-dimensional high-entropy alloy-polymer composite nanolattices**  
Technical Presentation. IMECE2018-89230  
*Xiaoyan Li, Xuan Zhang, Tsinghua University, Beijing, China*

## **12-39 DRUCKER MEDAL SYMPOSIUM**

### **12-39-3 Drucker Medal Symposium**

**Fourth Floor, David L. Lawrence Convention Center, Room 403      3:45pm - 5:30pm**

Session Chair: **Wei Cai**, *Stanford University, Stanford, CA, United States*

**3:45pm**      **Growth, Characterization and Modeling of Single Crystalline and Bi-crystalline Thin Films of Gold on Amorphous Insulating Substrates**  
Technical Presentation. IMECE2018-89374  
*William Nix, Rui Yang, Rachel Traylor, Stanford University, Stanford, CA, United States, Ill Ryu, University of Texas at Dallas, Richardson, TX, United States, Jonathan Fan, Stanford University, Stanford, CA, United States*

**4:06pm**      **Mechanical behavior of solder interconnects under high current density**  
Technical Presentation. IMECE2018-89121  
*Leon Keer, Northwestern University, Evanston, IL, United States, Yao Yao, Northwestern Polytechnical University, Xi'an, China*

**4:27pm**      **Mechanics of Metallic Nanowires ? Stress Relaxation and Diffusion-mediated Failure**  
Technical Presentation. IMECE2018-89385  
*Horacio D. Espinosa, Northwestern University, Evanston, IL, United States, Wei Cai, Stanford University, Stanford, CA, United States, Rajaprakash Ramachandramoorthy, Northwestern University, Evanston, IL, United States, Yanming Wang, Amin Aghaei, Stanford University, Palo Alto, CA, United States, Gunther Richter, Max Planck Institute, Stuttgart, Germany*

**4:48pm**      **Mechanical Properties of Metallic Nanocubes: Bimetallic Interfaces and Controlled Porosity**  
Technical Presentation. IMECE2018-89102  
*Wendy Gu, Stanford University, Palo Alto, CA, United States, Mehrdad Kiani, Radhika Patil, Wei Cai, Yifan Wang, Stanford University, Stanford, CA, United States*

**5:09pm**      **A New Type of Superelastic and Shape Memory Materials: ThCr<sub>2</sub>Si<sub>2</sub> -Structured Intermetallic Compound at Small Length Scales**  
Technical Presentation. IMECE2018-90040  
*Seok-Woo Lee, University of Connecticut, Storrs, CT, United States*

**WEDNESDAY, NOVEMBER, 14**

**12-1 MECHANICS OF SOFT MATERIALS**

**12-1-7 Mechanics of Soft Materials: Characterization**

**Room 338 10:00am - 11:45am**

Session Chair: **Qiming Wang**, *University of Southern California, Los Angeles, CA, United States*

**10:00am Synchrotron In Situ Tomography Observation of Damage Mechanism Transition in UV Aged Polyamide-6**

**Technical Presentation.** IMECE2018-89616

**Kenneth Noel Cundiff**, *Texas A&M University, College Station, TX, United States*, **Yazid Madi**, *Mines ParisTech, Paris, France*, **Ahmed Amine Benzerga**, *Texas A&M Univ, College Station, TX, United States*

**10:21am Limitations Of Tensile Test For Modeling Complex Deformations Of Hyperelastic Materials**

**Technical Presentation.** IMECE2018-89014

**Kshitiz Upadhyay**, *University of Florida, Gainesville, FL, United States*, **Ghatu Subhash**, *Univ of Florida - Gainesville, Gainesville, FL, United States*, **Douglas Spearot**, *University of Florida, Gainesville, FL, United States*

**10:42am Novel AFM-based Dynamic Indentation Experiments to Capture Local Viscoelastic Mechanical Property Distributions in Soft Heterogeneous Materials**

**Technical Presentation.** IMECE2018-96533

**Pavan Kolluru**, *Duke University, Durham, NC, United States*, **Matthew Eaton**, **David Collinson**, **David Delgado**, **Kenneth Shull**, *Northwestern University, Evanston, IL, United States*, **L. Catherine Brinson**, *Duke University, Durham, NC, United States*

**11:03am High Strain Rate Dynamic Behavior of Mechanophore Embedded Silicone Elastomers**

**Technical Presentation.** IMECE2018-89750

**Logan Shannahan**, *Army Research Laboratory, Aberdeen, MD, United States*, **James Berry**, *SURVICE Engineering, Inc., Aberdeen Proving Ground, MD, United States*, **Yangju Lin**, **Meredith Barbee**, **Stephen Craig**, *Duke University, Durham, NC, United States*, **Muge Fermen-Coker**, *Army Research Laboratory, Aberdeen Proving Ground, MD, United States*

**11:24am Characterization of a Polyurea Microsphere Reinforced Polyurea Matrix Composite**

**Technical Presentation.** IMECE2018-89766

**Sophia Do**, **George Youssef**, *San Diego State University, San Diego, CA, United States*

**12-4 MECHANICS OF ADHESION AND FRICTION**

**12-4-1 Mechanics of Adhesion and Friction**

**Fourth Floor, David L. Lawrence Convention Center, Room 402 10:00am - 11:45am**

Session Chair: **Jianliang Xiao**, *University of Colorado Boulder, Boulder, CO, United States*

**10:00am Mechanics of Adhesion and Friction in 2D Materials**

**Invited Presentation.** IMECE2018-89143

**Frank DelRio**, *National Institute of Standards and Technology, Louisville, CO, United States*, **Bien-Cuong Tran Khac**, **Koo-Hyun Chung**, *University of Ulsan, Ulsan, Korea (Republic)*

**10:42am Frictional Characteristics of Graphene Wrapped Nanodiamond and Graphitized Nanodiamond using Molecular Dynamics Simulation**

**Technical Presentation.** IMECE2018-89928

**Srilok Srinivasan**, *Iowa State University, Ames, IA, United States*, **Diana Berman**, *University of North Texas, Denton, TX, United States*, **Ganesh Balasubramanian**, *Lehigh University, Bethlehem, PA, United States*, **Subramanian KRS Sankaranarayanan**, *Argonne National Laboratory, Lemont, IL, United States*, **Ali Erdemir**, *Argonne National Laboratory, Argonne, IL, United States*, **Anirudha Sumant**, *Argonne National Laboratory, Lemont, IL, United States*

**11:03am Nanoscale Probing of Interaction in Atomically Thin Layered Materials**

**Technical Presentation.** IMECE2018-88319

**Hossein Rokni**, *Mechanical Engineering/Univ of Michigan, Ann Arbor, MI, United States*, **Wei Lu**, *Univ Of Michigan, Ann Arbor, MI, United States*

**11:24am Atomic-scale Tribology Elucidated by In Situ Approaches**

**Technical Presentation.** IMECE2018-89544

**Robert W. Carpick**, *University of Pennsylvania, Philadelphia, PA, United States*

**12-7 MULTISCALE MODELS AND EXPERIMENTAL TECHNIQUES FOR COMPOSITE MATERIALS AND STRUCTURES**

**12-7-1 Multiscale Models and Experimental Techniques for Composite Materials and Structures**

**Fourth Floor, David L. Lawrence Convention Center, Room 403 10:00am - 11:45am**

Session Chair: **Dianyun Zhang**, *University of Connecticut, Storrs, CT, United States*

**10:00am Damage Characterization of Carbon and Glass Fiber Composite Plates Subjected to Low-Velocity Impact Using Thermography**

**Technical Paper Publication.** IMECE2018-86543

**Khaled Al-Athel**, *King Fahd University of Petroleum & Minerals, Dhahran, Saudi Arabia*, **Ahmed Alomari**, *Saudi Aramco, Dammam 31483, Saudi Arabia*, **Abul Fazal M. Arif**, *King Fahd Univ of Petroleum & Minerals (KFUPM), Dhahran, Saudi Arabia*

**10:21am Analysis of Coated Fibrous Multiferoic Composites Subjected to Large Electric Driving Field**

**Technical Presentation.** IMECE2018-86968

**Sheng-hsiang Chen**, **Chien-hong Lin**, *National Cheng Kung University, Tainan, Taiwan*

**10:42am** Utility of 2D Finite Element Simulations for Predicting Effective Thermomechanical Properties of Particle-Reinforced Composites

Technical Paper Publication. IMECE2018-87031

*Kamran Makarian, Villanova University, Ardmore, PA, United States, Sridhar Santhanam, Villanova University, Collegeville, PA, United States*

**11:03am** Development of Novel Compact Compression Specimen for Matrix Compression Damage Initiation and Propagation Behavior in Fiber Reinforced Composites

Technical Paper Publication. IMECE2018-87106

*Tim McKinley, Kevin Carpenter, John P. Parmigiani, Oregon State University, Corvallis, OR, United States*

**11:24am** A Multi-Scale Processing Model for Predicting Cure-Induced Residual Stress in Thermoset Composites

Technical Presentation. IMECE2018-89866

*Weijia Chen, Dianyuan Zhang, University of Connecticut, Storrs, CT, United States*

## **12-12 MECHANICS OF THIN-FILM AND MULTI-LAYER STRUCTURES**

**12-12-4 Mechanics of Thin-Film and Multi-Layer Structures**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 10:00am - 11:45am**

Session Chair: *Shuodao Wang, Oklahoma State Univ, Stillwater, OK, United States*

**10:00am** An Analysis of Metal-Composite Hybrid Joint for Static Loading

Technical Presentation. IMECE2018-89625

*Shah Alam, Texas A&M University-Kingsville, Kingsville, TX, United States, Ulan Dakeev, Mohammad Saquib, Texas A&M University - Kingsville, Kingsville, TX, United States*

**10:21am** Effects of Plasticity on the Creeping Process in the Manufacturing of Tissue Paper

Technical Presentation. IMECE2018-89265

*Kui Pan, A. Srikantha Phani, Sheldon Green, University of British Columbia, Vancouver, BC, Canada*

**10:42am** Experimental investigation into energy amplification in tri-layer polymer/polymer composites

Technical Presentation. IMECE2018-89958

*George Youssef, Brian Wang, San Diego State University, San Diego, CA, United States*

**11:03am** Study on Dynamic Performance of the Non-Circular Bearings Using Fourier Analysis

Technical Paper Publication. IMECE2018-88420

*JIALE TIAN, Baisong Yang, Lie Yu, Jian Zhou, Xi'an Jiaotong University, Xi'an, China*

**11:24am** Research on Topology Optimization of Level Set Method Based on Incompatible Element

Technical Presentation. IMECE2018-88915

*Dongyue Qu, Haibing Zhang, Jianan Xu, Qiang Chen, Harbin engineering university, Harbin city, China*

## **12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS**

**12-21-1 Fatigue Modeling in Engineering Materials**

**Fourth Floor, David L. Lawrence Convention Center, Room 405 10:00am - 11:45am**

Session Chair: *Ke Li, Schlumberger, Sugar Land, TX, United States*

Session Co-Chair: *Huijuan Zhao, Clemson University, Clemson, SC, United States*

**10:00am** Characterizing the Fatigue Behavior of Wrought Fe-Co-2V using Experimental, Computational, and Analytical Techniques

Technical Presentation. IMECE2018-89185

*Matthew J. Mills, University of California, Davis, Davis, CA, United States, Jacob Biddlecom, Clemson University, Clemson, SC, United States, Benedict Pineyro, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States, Tariq Khraishi, University Of New Mexico, Albuquerque, NM, United States, Kyle L. Johnson, Scott Grutzik, Adam Brink, Sandia National Laboratories, Albuquerque, NM, United States, Matthew Brake, Rice University, Houston, TX, United States*

**10:21am** Numerical evaluation of fatigue crack growth in monomer membrane based on plastically dissipated energy

Technical Presentation. IMECE2018-89674

*Morshed Hasan, University of Delaware, Newark, DE, United States, Jixin Chen, Ford Motor Company, Dearborn, MI, United States, Anette Karlsson, Cleveland State University, Cleveland, OH, United States, Michael Santare, University of Delaware, Newark, DE, United States*

**10:42am** Fatigue Life Prediction of Cold Rolled Rotary Shouldered Threaded Connections

Technical Paper Publication. IMECE2018-87801

*Fei Song, Michael Du, Ke Li, Schlumberger, Sugar Land, TX, United States*

**11:03am** Mechanics of Fatigue Failure of Aluminum Center Crack Tension Specimens and Repair using Low Modulus Composite Patches

Technical Presentation. IMECE2018-87205

*Hugh Bruck, Univ of Maryland, College Park, MD, United States, Daniel Hart, Paul Lara, NSWC Carderock, West Bethesda, MD, United States*

## 12-31 MECHANICAL METAMATERIALS

### 12-31-3 Mechanics of Mechanical Metamaterials

Fourth Floor, David L. Lawrence Convention Center,  
Room 401 10:00am - 11:45am

Session Chair: **Eduard Karpov**, *University of Illinois at Chicago, Glenview, IL, United States*

Session Co-Chair: **Sung Kang**, *Johns Hopkins University, Baltimore, MD, United States*

#### 10:00am Auxetic Composite Metamaterials with Enhanced Mechanical Properties

Technical Presentation. IMECE2018-89285

**Lifeng Wang**, *Stony Brook University, Stony Brook, NY, United States*

#### 10:21am Study on the Phononic Band-structure of Soft Granular Crystals

Technical Presentation. IMECE2018-89097

**Nidhish Jain, Jongmin Shim**, *University at Buffalo, Buffalo, NY, United States*

#### 10:42am Undulated Lattice Structures by Vertices? Torsion for Elastic Wave Filtering

Technical Presentation. IMECE2018-89091

**Zhihao Yuan, Jaehyung Ju**, *Shanghai Jiao Tong University, Shanghai, China*

#### 11:03am Strain Energy Transformation Pathways in Highly Nonlocal Mechanical Metamaterials

Technical Presentation. IMECE2018-89971

**Eduard Karpov**, *University of Illinois at Chicago, Glenview, IL, United States*, **Larry Danso, John Klein**, *University of Illinois at Chicago, Chicago, IL, United States*

#### 11:24am Mimicking Pseudo-elastic Behavior and Shape Memory Effect using Architected Metamaterials

Technical Presentation. IMECE2018-87239

**Yunlan Zhang, Mirian Velay, Kristiaan Hector**, *Purdue University, West Lafayette, IN, United States*, **David Restrepo**, *San Antonio University, San Antonio, TX, United States*, **Nilesh Mankame**, *General Motors Res & Dev, Warren, MI, United States*, **Pablo Zavattieri**, *Purdue University, West Lafayette, IN, United States*

## 12-1 MECHANICS OF SOFT MATERIALS

### 12-1-8 Mechanics of Soft Materials: Fracture, dissipation, and self-healing

Room 338 1:45pm - 3:30pm

Session Chair: **Aurelie Azoug**, *Oklahoma State University, Stillwater, OK, United States*

#### 1:45pm Self-Healing Mechanics of Soft Polymers

Technical Presentation. IMECE2018-89726

**Qiming Wang**, *University of Southern California, Los Angeles, CA, United States*

#### 2:06pm Material sink approach for modeling fracture of soft solids

Technical Presentation. IMECE2018-89031

**Konstantin Volokh**, *Technion - Israel Institute of Technology, Haifa, Israel*

#### 2:27pm A gradient damage model of polydisperse polymers

Technical Presentation. IMECE2018-89388

**Bin Li, Nikolaos Bouklas**, *Cornell University, Ithaca, NY, United States*

#### 2:48pm Dissipations in liquid crystal elastomers at the nematic-isotropic transition

Technical Presentation. IMECE2018-89590

**Aurelie Azoug, Jeb Wallace**, *Oklahoma State University, Stillwater, OK, United States*

#### 3:09pm Rehealable, fully recyclable and malleable electronic skin enabled by dynamic covalent thermoset nanocomposite

Technical Presentation. IMECE2018-89639

**Zhanan Zou, Jianliang Xiao**, *University of Colorado Boulder, Boulder, CO, United States*

## 12-4 MECHANICS OF ADHESION AND FRICTION

### 12-4-2 Mechanics of Adhesion and Friction

Fourth Floor, David L. Lawrence Convention Center,  
Room 402 1:45pm - 3:30pm

Session Chair: **Jianliang Xiao**, *University of Colorado Boulder, Boulder, CO, United States*

#### 1:45pm Atomic Scale Friction in DNA plectonemes

Technical Presentation. IMECE2018-89023

**Prashant K. Purohit, Yifei Min**, *University of Pennsylvania, Philadelphia, PA, United States*

#### 2:06pm Surface Roughness Dependent Adhesion: Finite Element Modeling And Analysis

Technical Presentation. IMECE2018-89081

**Weilin Deng, Haneesh Kesari**, *Brown University, Providence, RI, United States*

#### 2:27pm Crater-enabled dry adhesion

Technical Presentation. IMECE2018-89209

**LIU WANG, KyoungHo Ha, Shutao Qiao, Nanshu Lu**, *UNIVERSITY OF TEXAS AT AUSTIN, AUSTIN, TX, United States*

#### 2:48pm Characterizing Adhesion of Silver Nano Wire Graphene Composite in Multi-layered Structure

Technical Presentation. IMECE2018-89403

**Chenglin Wu, Yanxiao Li, Congjie Wei**, *Missouri University of Science and Technology, Rolla, MO, United States*

**3:09pm** Tunable Dry Adhesion of Elastomeric Posts Enabled by Stiffness Tuning of Microfluidic Serpentine channel of LMPA

Technical Presentation. IMECE2018-89834

*Amir Mohammadi Nasab, University of Nevada, Reno, Reno, NV, United States, Patrick Stampfli, NevadaNano, Sparks, NV, United States, Aoyi Luo, Kevin Turner, University of Pennsylvania, Philadelphia, PA, United States, Wanliang Shan, University of Nevada Reno, Reno, NV, United States*

## **12-7 MULTISCALE MODELS AND EXPERIMENTAL TECHNIQUES FOR COMPOSITE MATERIALS AND STRUCTURES**

**12-7-2 Multiscale Models and Experimental Techniques for Composite Materials and Structures**

**Fourth Floor, David L. Lawrence Convention Center, Room 403 1:45pm - 3:30pm**

Session Chair: **Dianyun Zhang**, *University of Connecticut, Storrs, CT, United States*

**1:45pm** Effective Property Estimation of CMC Mini-composites Considering Porosity

Technical Paper Publication. IMECE2018-87337

*Abhilash M. Nagaraja, Suhasini Gururaja, Indian Institute of Science, Bangalore, Karnataka, India*

**2:06pm** Phantom-Element Technique for Periodic Deformation Analysis of Plain Fabrics Using LS-DYNA

Technical Paper Publication. IMECE2018-87359

*Hikaru Miyaki, Graduate School, Kyoto Institute of Technology, Kyoto, Japan, Atsushi Sakuma, Kyoto Institute of Technology, Kyoto, Japan*

**2:27pm** Evaluation of Transverse Shear Moduli of Composite Sandwich Beams Through Three-Point Bending Tests

Technical Paper Publication. IMECE2018-87636

*Ozgun Sener, METU Center for Wind Energy, Ankara, Turkey, Oguzhan Dede, Middle East Technical University, Ankara, Turkey, Oguz Atalay, METU Center for Wind Energy, Ankara, Turkey, Mert Atasoy, ASELSAN Inc., Ankara, Turkey, Altan Kayran, METU Center for Wind Energy, Ankara, Turkey*

**2:48pm** A Combined CFD-Solid Finite Element Model to Study the Mechanics of Sand Erosion Damage in Coated Glass Fiber Reinforced Polymer

Technical Paper Publication. IMECE2018-87966

*Mohamed Tawfik Eraky, Centre for Advanced Materials, The British University in Egypt, El-Sherouk City, Cairo, Egypt, Tarek Elmelegy, The British University in Egypt, Cairo, Egypt, Mostafa Shazly, The British University In Egypt, El Sherouk City, Egypt, Nabil Eltayeb, The British University in Egypt, El-Sherouk City, Cairo, Egypt*

**3:09pm** Multiscale simulation of uni-directional carbon fiber reinforced polymer composites

Technical Presentation. IMECE2018-89956

*Mahsa Tajdari, Northwestern University, Evanston, IL, United States, Wing Liu, Northwestern Univ, Evanston, IL, United States*

## **12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS**

**12-21-2 Fracture Modeling in Engineering Materials**

**Fourth Floor, David L. Lawrence Convention Center, Room 405 1:45pm - 3:30pm**

Session Chair: **Rui Zhang**, *The University of Texas at Dallas, Richardson, TX, United States*

Session Co-Chair: **Qingda Yang**, *Univ Of Miami, Coral Gables, FL, United States*

**1:45pm** 3D Augmented Finite Element Analysis of Coupled Ply Cracking and Delamination in Curved Composite Laminates

Technical Presentation. IMECE2018-89783

*Qingda Yang, Univ Of Miami, Coral Gables, FL, United States*

**2:06pm** Multiscale Fracture Simulation Based On Coupled Space-Time Finite Element Method And Peridynamics

Technical Presentation. IMECE2018-89257

*Rui Zhang, Shogo Wada, Clint Nicely, The University of Texas at Dallas, Richardson, TX, United States, Qian Qian, University of Texas at Dallas, Richardson, TX, United States*

**2:27pm** Multiscale Virtual Testing and Validation of a DARPA TuFF Material

Technical Presentation. IMECE2018-89767

*Qingda Yang, Univ Of Miami, Coral Gables, FL, United States, Gunnar Nyger, Liang Wang, Jari Karkkainen, University of Miami, Coral Gables, FL, United States*

**2:48pm** Numerical simulation of lithiation driven phase-change and fracture in Silicon

Technical Presentation. IMECE2018-89851

*Ataollah Mesgarnejad, Alain Karma, Northeastern University, Boston, MA, United States*

## **12-29 PERIDYNAMIC MODELING OF MATERIALS? BEHAVIOR**

**12-29-1 Peridynamic modelling and analysis**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 1:45pm - 3:30pm**

Session Chair: **Hailong Chen**, *University of Kentucky, Lexington, KY, United States*

Session Co-Chair: **Erdogan Madenci**, *University Of Arizona, Tucson, AZ, United States, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

**1:45pm** Study of Spurious Wave Reflection at the Interface of Peridynamics and Finite Element Regions

Technical Paper Publication. IMECE2018-86129

*Shank S. Kulkarni, University of North Carolina at Charlotte, Charlotte, NC, United States, Xiaonan Wang, ANSYS, Cannonsburg, PA, United States, Alireza Tabarraei, University of North Carolina Charlotte, Charlotte, NC, United States*

**2:06pm** Peridynamic modelling of crack nucleation

**Technical Presentation.** IMECE2018-88149

*Sina Niazi, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

**2:27pm** Peridynamics as a Module in the MOOSE Framework

**Technical Presentation.** IMECE2018-89098

*Hailong Chen, University of Kentucky, Lexington, KY, United States, Benjamin Spencer, Idaho National Laboratory, Idaho Falls, ID, United States*

**2:48pm** Peridynamic Unit Cell for Effective Properties of Different Microstructure Scales

**Technical Presentation.** IMECE2018-89683

*Erdogan Madenci, University Of Arizona, Tucson, AZ, United States, Atila Barut, Amin Yaghoobi, Global Engineering Research and Technologies, Tucson, AZ, United States, Nam Phan, Naval Air Systems Command (NAVAIR), Patuxent River, MD, United States*

## **12-31 MECHANICAL METAMATERIALS**

### **12-31-4 Reconfigurable Mechanical Metamaterials**

**Fourth Floor, David L. Lawrence Convention Center, Room 401 1:45pm - 3:30pm**

Session Chair: **Jie Yin**, Temple U, Haverford, PA, United States

Session Co-Chair: **Yaning Li**, University of New Hampshire, Durham, NH, United States

**1:45pm** The connection effect of a Snipeology-based modular origami structure on its reconfigurability

**Technical Presentation.** IMECE2018-89119

*Kai Xiao, Jaehyung Ju, Shanghai Jiao Tong University, Shanghai, Select State/Province, China*

**2:06pm** Design of Reconfigurable Kirigami Metamaterials

**Technical Presentation.** IMECE2018-89351

*Yanbin Li, Yaoye Hong, Temple University, Philadelphia, PA, United States, Jie Yin, Temple U, Haverford, PA, United States*

**2:27pm** Kirigami-Inspired Materials for Tunable Mechanical and Adhesive Systems

**Technical Presentation.** IMECE2018-89798

*Doh-Gyu Hwang, Katie Trent, Michael D. Bartlett, Iowa State University, Ames, IA, United States*

**2:48pm** Harnessing Multistable Kirigami for Reconfigurable Mechanical Metamaterials

**Technical Presentation.** IMECE2018-89329

*Yi Yang, Boston University, Boston, MA, United States, Marcelo Dias, Aarhus University, Aarhus, Denmark, Douglas Holmes, Boston University, Boston, MA, United States*

**3:09pm** Geometric Role in Designing Pneumatically Actuated Pattern-transforming Metamaterials

**Technical Presentation.** IMECE2018-89368

*Yuzhen Chen, UCLA, Los Angeles, CA, United States, Lihua Jin, University of California, Los Angeles, Los Angeles, CA, United States*

## **12-4 MECHANICS OF ADHESION AND FRICTION**

### **12-4-3 Mechanics of Adhesion and Friction**

**Fourth Floor, David L. Lawrence Convention Center, Room 402 3:45pm - 5:30pm**

Session Chair: **Jianliang Xiao**, University of Colorado Boulder, Boulder, CO, United States

**3:45pm** Rate Dependent Tensile and Shear Interactions between Silicon and Epoxy

**Technical Presentation.** IMECE2018-89461

*Tianhao Yang, University of Texas at Austin, Austin, TX, United States, Rui Huang, Univ Of Texas At Austin, Austin, TX, United States, Kenneth Liechti, Univ Of Texas, Austin, TX, United States*

**4:06pm** Development of Empirical Asperity Contact Model for Oil-Lubricated Friction Material

**Technical Presentation.** IMECE2018-88698

*Hiral Haria, Ford Motor Company, Farmington Hills, MI, United States, Yuji Fujii, Ford Motor Co, Dearborn, MI, United States, Gregory M. Pietron, Ford Motor Company, Dearborn, MI, United States, Masatoshi Miyagawa, Takahiro Tsuchiya, F.C.C. CO., LTD., Hamamatsu-Shi, Shizuoka-Ken, Japan, Shinji Nakamura, Hiroya Miyoshi, F.C.C. Co., LTD., Livonia, MI, United States, Shiyang Hou, Pengchuan Wang, Nikolaos D. Katopodes, University of Michigan, Ann Arbor, MI, United States*

**4:27pm** Interface-derived viscoelasticity

**Technical Presentation.** IMECE2018-88680

*Leboan D. Chung, Univ At Buffalo, State Univ of NY, Buffalo, NY, United States*

**4:48pm** Adhesive Contact Of A Weierstrass Surface Profile

**Technical Presentation.** IMECE2018-86366

*Harish Radhakrishnan, Sreekanth Akarapu, ANSYS Inc, Houston, TX, United States*

**5:09pm** Experimental and Numerical Study of Contact Mechanics of Bolted L-Brackets

**Technical Presentation.** IMECE2018-87033

*Samet Emre YILMAZ, FNSS Defence Systems Inc., Ankara, Turkey, Altan Kayran, METU Center for Wind Energy, Ankara, Turkey, Ercan Gurses, Demirkan Coker, Middle East Technical University, Ankara, Turkey*

**Draft Program**

## 12-5 QUANTITATIVE VISUALIZATION OF FRACTURE AND FAILURE

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### 12-5-1 Quantitative Visualization Related to Fracture & Crack Growth Processes

Fourth Floor, David L. Lawrence Convention Center, Room 401 3:45pm - 5:30pm

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Session Chair: **Leslie Lamberson**, *Drexel University, Philadelphia, PA, United States*

Session Co-Chair: **Natasha Vermaak**, *Lehigh University, Bethlehem, PA, United States*, **Ryan Berke**, *Utah State University, Logan, UT, United States*, **Ali Ghahremaninezhad**, *University of Miami, Coral Gables, FL, United States*

#### 3:45pm Identifying the Crack Initiation Site in Polycrystalline Nickel through Surface Profile Changes Using Scanning White Light Interferometry (SWLI)

Technical Presentation. IMECE2018-87176

**jalal fathi sola**, *University of Texas at Arlington, Arlington, TX, United States*, **Haiying Huang**, *Univ Of Texas/arlington, Arlington, TX, United States*

#### 4:06pm Disappearance of Strengthened Micro Texture of Modified 9Cr-1Mo Steel Caused by Stress-Induced Acceleration of Atomic Diffusion at Elevated Temperatures

Technical Paper Publication. IMECE2018-87368

**Yifan Luo**, *Hideo Miura*, *Tohoku University, Sendai, Miyagi, Japan*

#### 4:27pm Observation of Cracking and Measurement of Fracture Toughness in Graphite

Technical Presentation. IMECE2018-87962

**Cheng Liu**, **Carl Cady**, **Bob Stevens**, *Los Alamos National Laboratory, Los Alamos, NM, United States*

#### 4:48pm Crack Tip Fields and Location From Full Field Molecular Dynamics Data

Technical Presentation. IMECE2018-88897

**Mark Wilson**, **Michael Chandross**, **Scott Grutzik**, *Sandia National Laboratories, Albuquerque, NM, United States*

#### 5:09pm Full-Field Quantitative Visualization of Impact Induced Deformations and Stresses in Ceramics and Glass Using Digital Gradient Sensing

Technical Presentation. IMECE2018-89035

**Chengyun Miao**, *Auburn University, Auburn, AL, United States*, **Hareesh Tippur**, *Auburn Univ, Auburn, AL, United States*

## 12-7 MULTISCALE MODELS AND EXPERIMENTAL TECHNIQUES FOR COMPOSITE MATERIALS AND STRUCTURES

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### 12-7-3 Multiscale Models and Experimental Techniques for Composite Materials and Structures

Fourth Floor, David L. Lawrence Convention Center, Room 403 3:45pm - 5:30pm

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Session Chair: **Dianyuan Zhang**, *University of Connecticut, Storrs, CT, United States*

#### 3:45pm Multiscale Reduced Order Modeling of Failure in Composites Based on Discrete Interfaces

Technical Presentation. IMECE2018-88984

**Caglar Oskay**, **Zimu Su**, **Berkcan Kapusuzoglu**, *Vanderbilt University, Nashville, TN, United States*

#### 4:06pm Mesoscale Material Strength Characterization for Use in Fracture Modeling

Technical Paper Publication. IMECE2018-88249

**Katherine A. Acton**, *University of St. Thomas, St. Paul, MN, United States*, **Bahador Bahmani**, *University of Tennessee, Knoxville, Tullahoma, TN, United States*, **Reza Abedi**, *University of Tennessee, Tullahoma, TN, United States*

#### 4:27pm Multiscale Characterization of Fabrication Defects and Their Effects in Composite Structures

Technical Presentation. IMECE2018-88541

**Jim Lua**, *1961, Kendall Park, NJ, United States*, **Xiaodong Cui**, **Ali Sadeghirad**, *Global Engineering and Materials, Inc., Princeton, NJ, United States*, **Alden Hyde**, *Utah State University, Logan, UT, United States*, **Ling Liu**, *Utah State Univ, Logan, UT, United States*

#### 4:48pm Nacre-inspired architected interface leads to structural materials with superior mechanical properties

Technical Presentation. IMECE2018-89379

**Grace X. Gu**, *UC Berkeley, Berkeley, CA, United States*, **Flavia Libonati**, *Politecnico di Milano / MIT, Cambridge, MA, United States*, **Daly Wettermark**, **Markus Buehler**, *MIT, Cambridge, MA, United States*

## 12-21 SYMPOSIUM ON MODELING OF THE FRACTURE FAILURE AND FATIGUE IN SOLIDS

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### 12-21-3 Material Model and Fracture Theory Development

Fourth Floor, David L. Lawrence Convention Center, Room 405 3:45pm - 5:30pm

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Session Chair: **Alireza Amirkhizi**, *University of Massachusetts, Lowell, Lowell, MA, United States*

Session Co-Chair: **Kazem Alidoost**, *University of Illinois at Urbana-Champaign, Champaign, IL, United States*

#### 3:45pm Energy Release Rate Approximation for Surface Cracks in Three-Dimensional Domains Using the Topological Derivative

Technical Presentation. IMECE2018-89429

**Kazem Alidoost**, *University of Illinois at Urbana-Champaign, Champaign, IL, United States*, **Meng Feng**, *Massachusetts Institute of Technology, Cambridge, MA, United States*, **Philippe Geubelle**, *University of Illinois, Urbana, IL, United States*, **Daniel Tortorelli**, *Univ Of Illinois/urbana, Urbana, IL, United States*

#### 4:06pm A Constitutive Model for Ductile and Brittle Failures of Semicrystalline Polymers

Technical Presentation. IMECE2018-87750

**Anu Tripathi**, *University of Minnesota, Twin-Cities, MN, Minneapolis, MN, United States*, **Susan Mantell**, **Jia-Liang Le**, *University of Minnesota, Twin-Cities, MN, Minneapolis, MN, United States*

**4:27pm** Failure of Elastomeric Coatings under Cavitation Erosion

Technical Presentation. IMECE2018-88401

*Alireza Amirkhizi, Vahidreza Alizadeh, University of Massachusetts, Lowell, Lowell, MA, United States*

**4:48pm** Structural Transitions In Torsionally Constrained DNA And Their Dependence On Solution Electrostatics

Technical Presentation. IMECE2018-89050

*Jaspreet Singh, University of Pennsylvania, Philadelphia., Philadelphia, PA, United States, Prashant K. Purohit, University of Pennsylvania, Philadelphia, PA, United States*

## **12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS**

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**12-26-1 Mechanics of Soft Materials and Soft Robots**

**Room 338 3:45pm - 5:30pm**

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Session Chair: **Shaoxing Qu**, Zhejiang University, Hangzhou, Zhejiang, China

**3:45pm** Computational mechanics modeling of a continuum soft robot

Technical Presentation. IMECE2018-86141

*HONGYAN YUAN, University of Rhode Island, Kingston, RI, United States, Bahador Marzban, Richard Sperling, University of Rhode Island, Kingston, RI, United States*

**4:06pm** Numerical simulation tool for data-driven structural design of soft robots

Technical Presentation. IMECE2018-87619

*Mohammad Khalid Jawed, Weicheng Huang, University of California, Los Angeles, Los Angeles, CA, United States, Xiaonan Huang, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States*

**4:27pm** Constitutive Modeling of Property Evolution during Photopolymerization and 3D Printing

Technical Presentation. IMECE2018-89216

*Jiangtao Wu, Georgia Institute of Technology, Atlanta, GA, United States, Zeang Zhao, Peking University, Beijing, Beijing, China, H. Jerry Qi, Georgia Institute of Technology, Atlanta, GA, United States, Daining Fang, Beijing Institute of Technology, Beijing, Beijing, China*

**4:48pm** Additive Manufacturing: From 3D to 4D printing

Invited Presentation. IMECE2018-89221

*Daining Fang, Peking University, Beijing, China, Weili Song, Haosen Chen, Beijing Institute of Technology, Beijing, China, Yihui Zhang, Tsinghua University, Beijing, China, H. Jerry Qi, Georgia Institute of Technology, Atlanta, GA, United States*

## **12-29 PERIDYNAMIC MODELING OF MATERIALS? BEHAVIOR**

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**12-29-2 Peridynamics for composites, fracture, and corrosion damage**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 3:45pm - 5:30pm**

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Session Chair: **Pablo Seleson**, Oak Ridge National Laboratory, Oak Ridge, TN, United States

Session Co-Chair: **Florin Bobaru**, University of Nebraska-Lincoln, Lincoln, NE, United States

**3:45pm** Anisotropy in Two-Dimensional and Plane Elasticity Bond-Based Peridynamics

Technical Presentation. IMECE2018-89977

*Jeremy Trageser, Pablo Seleson, Oak Ridge National Laboratory, Oak Ridge, TN, United States*

**4:06pm** Dynamic Fracture at an Interface: a Peridynamic Analysis

Technical Presentation. IMECE2018-86933

*Javad Mehrmashhadi, Quang Le, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

**4:27pm** Peridynamic modeling of Intergranular Corrosion Damage

Technical Presentation. IMECE2018-86728

*Siavash Jafarzadeh, University of Nebraska-Lincoln, Lincoln, NE, United States, Ziguang Chen, Huazhong University of Science and Technology, Wuhan, Hubei, China, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

**4:48pm** The Peridynamic Coupling of Fracture, Diffusion, and Corrosion

Technical Presentation. IMECE2018-88250

*Jiangming Zhao, Siavash Jafarzadeh, University of Nebraska-Lincoln, Lincoln, NE, United States, Ziguang Chen, Huazhong University of Science and Technology, Wuhan, Hubei, China, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

## **THURSDAY, NOVEMBER, 15**

### **12-2 3D PRINTED SOFT MATERIALS**

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**12-2-1 3D Printing of Novel Materials**

**Third Floor, David L. Lawrence Convention Center, Room 333 8:55am - 10:40am**

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Session Chair: **Qiming Wang**, University of Southern California, Los Angeles, CA, United States

**8:55am** Multimaterial 3D Printing toward Additive Manufacturing Functional Devices Applications

Technical Presentation. IMECE2018-89212

*H. Jerry Qi, Georgia Institute of Technology, Atlanta, GA, United States*

**9:37am Physics and Mechanics in 3D Printing of Advanced Functional Materials**

**Technical Presentation.** IMECE2018-86275

*Hyunwoo Yuk, Massachusetts Institute of Technology, Cambridge, MA, United States, Xuanhe Zhao, MIT, Cambridge, MA, United States*

**9:58am Additive Manufacturing of Self-healing Elastomers**

**Technical Presentation.** IMECE2018-89815

*Kun Hao Yu, Qiming Wang, University of Southern California, Los Angeles, CA, United States*

**9:48am 3D Printing Soft Conductors using Liquid Metals**

**Technical Presentation.** IMECE2018-89916

*Taylor Neumann, North Carolina State University, CBE, Raleigh, NC, United States, Michael D. Dickey, North Carolina State University, Raleigh, NC, United States*

**9:38am Autonomous actuation of 3D printed bistable beam-based structures**

**Technical Presentation.** IMECE2018-88619

*Yijie Jiang, University of Pennsylvania, Philadelphia, PA, United States, Lucia M. Korpas, University of Pennsylvania, Philadelphia, PA, United States, Jordan R. Raney, University of Pennsylvania, Philadelphia, PA, United States*

**9:59am Ferromagnetic 4D Printing of Shape-programmable Soft Active Matter**

**Technical Presentation.** IMECE2018-87182

*Yoonho Kim, Hyunwoo Yu, Puikang Zhao, Massachusetts Institute of Technology, Cambridge, MA, United States, Shawn Chester, New Jersey Institute of Technology, Newark, NJ, United States, Xuanhe Zhao, MIT, Cambridge, MA, United States*

**10:20am Environmentally Responsive Composites Printed by a Multi-Phase 3D Printer**

**Technical Presentation.** IMECE2018-87376

*Xiyang Li, Jia Ming Zhang, Zhongyi Huang, Pengyu Lv, Xin Yi, Huiling Duan, Peking University, Beijing, China*

**12-3 MECHANICAL CHARACTERIZATION IN EXTREME ENVIRONMENTS**

**12-3-1 Mechanical Characterization in Extreme Environments I**

**Room 330 8:55am - 10:40am**

Session Chair: **Owen Kingstedt**, *The University of Utah, Salt Lake City, UT, United States*

Session Co-Chair: **Natasha Vermaak**, *Lehigh University, Bethlehem, PA, United States, Ryan Berke*, *Utah State University, Logan, UT, United States*

**8:55am Amorphization in Boron Carbide: Experimental and Computational Study**

**Invited Presentation.** IMECE2018-89063

*Ghatu Subhash, Univ of Florida - Gainesville, Gainesville, FL, United States, Amnaya Awasthi, University of Florida, Gainesville, FL, United States*

**9:37am Finite Element Analysis of Thermal Shock Resistance of Refractory Ceramic Composites**

**Technical Presentation.** IMECE2018-87034

*Kamran Makarian, Villanova University, Ardmore, PA, United States, Sridhar Santhanam, Villanova University, Collegeville, PA, United States*

**9:58am Experimental Evaluation of Effect of Temperature on Puncture Resistance of Glass Fiber Reinforced Polyester Composite**

**Technical Presentation.** IMECE2018-88869

*Saad Ahmed, University of Missouri, Columbia, MO, United States, Sanjeev Khanna, University of Missouri - Columbia, Columbia, MO, United States*

**10:19am High density grating fabrication techniques for high-temperature deformation measurement**

**Technical Presentation.** IMECE2018-89130

*Huimin Xie, Wei He, Bozhao Fan, Xianglu Dai, Tsinghua University, Beijing, China*

**12-14 ANISOTROPIC PLASTICITY OF TEXTURED AND MICROSTRUCTURALLY HETEROGENEOUS MATERIALS**

**12-14-1 Plastic anisotropy modeling**

**Room 331 8:55am - 10:40am**

Session Chair: **H. Eliot Fang**, *Sandia National Laboratories, Albuquerque, NM, United States*

Session Co-Chair: **Qiana C. Zaza**, *Univ Of Florida, Shalimar, FL, United States*

**8:55am Continuum description of anisotropic plasticity based on lower scales**

**Invited Presentation.** IMECE2018-86236

*Frederic Barlat, POSTECH, Pohang, Gyeongbuk, Korea (Republic)*

**9:37am A QUANTITATIVE MEASURE OF YIELD SURFACE CURVATURE AND ITS EFFECTS ON PROBLEMS IN PLASTICITY**

**Technical Presentation.** IMECE2018-87637

*William Scherzinger, Sandia National Laboratories, Albuquerque, NM, United States*

**9:58am Aspects of Anisotropic Yield Model Form: Calibration and Simulations**

**Technical Presentation.** IMECE2018-87692

*Edmundo Corona, William Scherzinger, Charlotte L.B. Kramer, Amanda Jones, Sandia National Laboratories, Albuquerque, NM, United States*

**10:19am Exploration Of Anisotropic Plasticity Models**

**Technical Presentation.** IMECE2018-89602

*Jake Ostien, Sandia National Laboratories, Livermore, CA, United States, William Scherzinger, Brian Lester, Sandia National Laboratories, Albuquerque, NM, United States*

## 12-25 MECHANICS AND DESIGN OF CELLULAR MATERIALS

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### 12-25-1 Mechanics and Design of Cellular Materials

Third Floor, David L. Lawrence Convention Center,  
Room 335 8:55am - 10:40am

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Session Chair: **Muhammad Ali**, *Ohio University, Athens, OH, United States*

**8:55am** "A Verified Non-Linear Regression Model for Elastic Stiffness Estimates of Finite Composite Domains Considering Combined Effects of Volume Fractions, Shapes, Orientations, Locations, and Number of Multiple Inclusions"  
Technical Paper Publication. IMECE2018-86231

*Ilige Hage*, *Notre Dame University-Louaize, Zouk Mosbeh, Lebanon*, *Charbel Seif*, *American University Of Beirut, Beirut, Lebanon*, *Remi Hage*, *Notre Dame University-Louaize, Zouk Mosbeh, Lebanon*, *Ramsey Hamade*, *American University Of Beirut, Beirut, Riad El Solh, Lebanon*

**9:16am** Control Of Interfacial Crack Behavior Via Internal Lattices In 3D Printed Structures

Technical Presentation. IMECE2018-86563

*Chengyang Mo*, *Jordan R. Raney*, *University of Pennsylvania, Philadelphia, PA, United States*

**9:37am** Study of Energy Absorption Characteristics of Square Tube With Composite Cellular Core

Technical Paper Publication. IMECE2018-86916

*Muhammad Ali*, *Eboreime Ohioma Khairul Alam*, *Ohio University, Athens, OH, United States*

**9:58am** Effect of Discrete Sectional Bonding of Cellular Core on Impact Performance of Square Tubes: A Finite Element Study

Technical Paper Publication. IMECE2018-86921

*Muhammad Ali*, *Eboreime Ohioma*, *Khairul Alam*, *Ohio University, Athens, OH, United States*

**10:19am** Perception Thresholding for Noise Removal in Micrographs of Cellular Tissues Acquired by Fluorescence Microscopy

Technical Paper Publication. IMECE2018-87231

*Saad Manzur*, *Mohammad Shawon*, *Mahmuda Naznin*, *Bangladesh University of Engineering & Technology, Dhaka, Dhaka, Bangladesh*, *Tanvir Faisal*, *Northwestern University, Chicago, IL, United States*

## 12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS

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### 12-26-2 Mechanics of Soft Materials and Soft Robots

Room 329 8:55am - 10:40am

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Session Chair: **Shaoxing Qu**, *Zhejiang University, Hangzhou, Zhejiang, China*

**8:55am** Soft Active Materials, Soft Machines & Mechanics

Technical Presentation. IMECE2018-89191

*Shaoxing Qu*, *Zhejiang University, Hangzhou, Zhejiang, China*

**9:16am** Adhesive Tough Magnetic Hydrogels with High Magnetic Nanoparticle Content

Technical Presentation. IMECE2018-89234

*Xiaocheng Hu*, *Guodong Nian*, *Zhejiang University, Hangzhou, China*

**9:37am** Monolithic Dual-pH Responsive Copolymer Actuator Inspired by Drosera

Technical Presentation. IMECE2018-89398

*Zilong Han*, *Zhejiang University, Hangzhou, China*

**9:58am** Programmable wrinkling of shape memory polymers with applications in tunable adhesion and nonuniform optical gratings

Technical Presentation. IMECE2018-89526

*Yu Wang*, *Houston Methodist Research Institute, Houston, TX, United States*, *Jianliang Xiao*, *University of Colorado Boulder, Boulder, CO, United States*

**10:19am** Tunable dry adhesion through static and dynamic stiffness tuning

Technical Presentation. IMECE2018-89968

*Wanliang Shan*, *University of Nevada Reno, Reno, NV, United States*, *Kevin Turner*, *University of Pennsylvania, Philadelphia, PA, United States*

## 12-27 MULTIFUNCTIONAL AND MICRO/NANO-STRUCTURED MATERIALS: MODELING AND CHARACTERIZATION

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### 12-27-1 Multifunctional and Micro/Nano-structured Materials: Modeling and Characterization (I)

Third Floor, David L. Lawrence Convention Center,  
Room 336 8:55am - 10:40am

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Session Chair: **Xin-Lin Gao**, *Southern Methodist University, Dallas, TX, United States*

Session Co-Chair: **Haifeng Zhao**, *Chinese Academy of Sciences, Beijing, China*

**8:55am** Numerical and Experimental Studies on the Development of Variable Density Nanocomposites for Structural Applications

Technical Paper Publication. IMECE2018-87252

*Jayaram Pothnis*, *Indian Institute of Science, Bangalore, Karnataka, India*, *Dinesh Kalyanasundaram*, *Indian Institute of Technology Delhi, New Delhi, Delhi, India*, *Suhasini Gururaja*, *Indian Institute of Science, Bangalore, Karnataka, India*

**9:16am** A New Method For Solving the Fission Gas Diffusion Equation With Time-varying Diffusion Coefficient and Source Term Considering Recrystallization of Fuel Grains

Technical Presentation. IMECE2018-89576

*Yunmei Zhao*, *Shurong Ding*, *Fudan University, Shanghai, China*

**9:37am Mechanical behavior of microscale polycrystalline silver pillars**

Technical Presentation. IMECE2018-86623

*Sadeq Saleh, Carnegie Mellon University, PITTSBURGH, PA, United States, Mehdi Hamid, Hussein Zbib, Washington State University, Pullman, WA, United States, Rahul Panat, Carnegie Mellon University, Pittsburgh, PA, United States*

**9:58am Nanoscale Mechanical Characterization of Graphene- and h-BN-Reinforced PMMA**

Technical Presentation. IMECE2018-89654

*Arab Hammad, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Zhizhong Dong, Rutgers University, Piscataway, NJ, United States, Bernard Kear, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Stephen Tse, Rutgers University, Piscataway, NJ, United States, Assimina Pelegri, Rutgers University, East Brunswick, NJ, United States*

**12-2 3D PRINTED SOFT MATERIALS**

**12-2-2 Mechanics of 3D Printed Materials**

Third Floor, David L. Lawrence Convention Center,  
**Room 333 10:50am - 12:35pm**

Session Chair: **Kai Yu, University of Colorado - Denver, Denver, CO, United States**

**10:50am Additive Manufacturing and Architected Materials**

Technical Presentation. IMECE2018-90396

*Christopher M. Spadaccini, Lawrence Livermore National Laboratory, Livermore, CA, United States*

**11:32am Design of Active Smart Materials via Additive Manufacturing: from Stimuli-Response to Self-Healing**

Technical Presentation. IMECE2018-89742

*Qiming Wang, University of Southern California, Los Angeles, CA, United States*

**11:53am Effects of Environmental Conditions on Geometrical and Mechanical Properties of Polycarbonate Samples Made by the Fused Filament Fabrication Process**

Technical Presentation. IMECE2018-89328

*YISHU YAN, Lichen Fang, Ojaswi Agarwal, JOHNS HOPKINS UNIVERSITY, Baltimore, MD, United States, Kevin Hemker, Johns Hopkins Univ, Baltimore, MD, United States, Sung Kang, Johns Hopkins University, Baltimore, MD, United States*

**12:14pm 3D Printing of Electroactive Hydrogel for Soft Robotic Manipulation and Locomotion**

Technical Presentation. IMECE2018-89387

*Daehoon Han, Rutgers University, Piscataway, NJ, United States, Cindy Farino, Chen Yang, Tracy Scott, Daniel Browe, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Wonjoon Choi, Korea University, School of Mechanical Engineering, Seoul, Korea (Republic), Joseph Freeman, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Howon Lee, Rutgers University, Piscataway, NJ, United States*

**12-3 MECHANICAL CHARACTERIZATION IN EXTREME ENVIRONMENTS**

**12-3-2 Mechanical Characterization in Extreme Environments II**

**Room 330 10:50am - 12:35pm**

Session Chair: **Ryan Berke, Utah State University, Logan, UT, United States**

Session Co-Chair: **Natasha Vermaak, Lehigh University, Bethlehem, PA, United States, Owen Kingstedt, The University of Utah, Salt Lake City, UT, United States**

**10:50am Location-specific Dynamic Response of As-built and Heat-treated Laser Powder Bed Fusion Inconel 718**

Technical Presentation. IMECE2018-89314

*Nadia Kouraytem, Raphaël Chanut, Ashley Spear, Owen Kingstedt, The University of Utah, Salt Lake City, UT, United States*

**11:11am Experimental and Numerical Analyses of Uniaxial Shakedown Behavior of 316 Stainless Steel**

Technical Presentation. IMECE2018-89790

*Ismail Soner Cinoglu, Ali Charbal, Natasha Vermaak, Lehigh University, Bethlehem, PA, United States*

**11:32am Numerical and experimental investigations of multiaxial shakedown of Inconel 625 at high temperature**

Technical Presentation. IMECE2018-89812

*Ali Charbal, Ismail Soner Cinoglu, Natasha Vermaak, Lehigh University, Bethlehem, PA, United States*

**11:53am A Customized UV Lens for In-Situ Measurements at High Temperature and High Magnification**

Technical Presentation. IMECE2018-90028

*Robert Hansen, Adam Smith, Ren Voie, Ryan Berke, Utah State University, Logan, UT, United States*

**12:14pm Effect of Exposure Time on Ultraviolet DIC at Extreme Temperatures**

Technical Presentation. IMECE2018-90029

*Thinh Thai, Robert Hansen, Adam Smith, Utah State University, Logan, UT, United States, Paul Gradl, NASA, Huntsville, AL, United States, Ryan Berke, Utah State University, Logan, UT, United States*

**12-14 ANISOTROPIC PLASTICITY OF TEXTURED AND MICROSTRUCTURALLY HETEROGENEOUS MATERIALS**

**12-14-2 Multi-Scale Modelling of plastic anisotropy**

**Room 331 10:50am - 12:35pm**

Session Chair: **William Scherzinger, Sandia National Laboratories, Albuquerque, NM, United States**

Session Co-Chair: **Brian Lester, Sandia National Laboratories, Albuquerque, NM, United States**

Draft Program

**10:50am** Plastic Anisotropy of Mg Single Crystal: the Effect of Slip and Twin  
Technical Presentation. IMECE2018-86706  
*Soondo Kweon, Daniel Selvakum Raja, Southern Illinois University Edwardsville, Edwardsville, IL, United States*

**11:11am** The Relationship Between Average Grain Profile Heights and Plastic Strains in Nickel Polycrystals Under Tensile Plastic Loading  
Technical Paper Publication. IMECE2018-88197  
*Kranthi Balusu, Univ. of Texas Arlington, Arlington, TX, United States, Haiying Huang, Univ Of Texas/arlinton, Arlington, TX, United States*

**11:32am** Multiscale modeling of the plastic behavior in single crystal tungsten: from atomistic to crystal plasticity simulations  
Technical Presentation. IMECE2018-87626  
*David Cereceda, Villanova University, Villanova, PA, United States, Martin Diehl, Franz Roters, Dierk Raabe, Max-Planck-Institut für Eisenforschung, Dusseldorf, Germany, Jose Manuel Perlado, Instituto de Fusion Nuclear, madrid, Spain, Jaime Marian, University of California Los Angeles, Los Angeles, CA, United States*

**11:53am** Plastic anisotropy in dynamic impact tests of single- and polycrystalline tantalum  
Technical Presentation. IMECE2018-86499  
*Hojun Lim, Jay Carroll, Corbett Battaile, Sandia National Laboratories, Albuquerque, NM, United States, Hyuk Jong Bong, Korean Institute of Material Science, Changwon, Korea (Republic), Shuh Rong Chen, Los Alamos National Laboratory, Los Alamos, NM, United States, Matthew Lim, Sandia National Laboratories, Albuquerque, NM, United States*

**12:14pm** NEW POLYCRYSTALLINE MODELING OF TEXTURED SHEETS  
Technical Presentation. IMECE2018-86079  
*Nitin Chandola, Benoit Revil-Baudard, University of Florida, Shalimar, FL, United States, Oana Cazacu, Univ Of Florida, Shalimar, FL, United States*

## **12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS**

### **12-21-4 Meso-scale Modeling and Material Fracture Characterization**

**Fourth Floor, David L. Lawrence Convention Center, Room 404 10:50am - 12:35pm**

Session Chair: *Mohsen Asle Zaeem, Colorado School of Mines, Golden, CO, United States*  
Session Co-Chair: *Xiaoyao Peng, Carnegie Mellon University, Pittsburgh, PA, United States*

**10:50am** A phase field model of dislocation dynamics in bcc crystals  
Technical Presentation. IMECE2018-89338  
*Xiaoyao Peng, Carnegie Mellon University, Pittsburgh, PA, United States, Abigail Hunter, Los Alamos National Laboratory, Los Alamos, NM, United States, Kaushik Dayal, Carnegie Mellon University, Pittsburgh, PA, United States*

**11:11am** Phase field damage modeling of mechanical degradation in polymers under hydro-thermo-mechanical loading conditions  
Technical Presentation. IMECE2018-89456  
*Vinamra Agrawal, Auburn University, Auburn, AL, United States*

**11:32am** Quantitative Simulation of Crack Propagation in Single-Phase and Composite Materials by A Modified Phase-Field Model  
Technical Presentation. IMECE2018-89051  
*Arezoo Emdadi, Missouri University of Science and Technology, Rolla, MO, United States, Mohsen Asle Zaeem, Colorado School of Mines, Golden, CO, United States*

**11:53am** Effective toughness in materials with interfaces  
Technical Presentation. IMECE2018-89149  
*Kaushik Vijaykumar, Haneesh Kesari, Brown University, Providence, RI, United States*

## **12-25 MECHANICS AND DESIGN OF CELLULAR MATERIALS**

### **12-25-2 Mechanics and Design of Cellular Materials**

**Third Floor, David L. Lawrence Convention Center, Room 335 10:50am - 12:35pm**

Session Chair: *Muhammad Ali, Ohio University, Athens, OH, United States*

**10:50am** Investigation of Non-Pneumatic Tires Based on Helical Hexagonal Cellular Structure  
Technical Paper Publication. IMECE2018-87631  
*Mihir Mangesh Pewekar, Pranit Sandye, Kiran Chaudhari, Rajiv Gandhi Institute of technology, Mumbai, Maharashtra, India*

**11:05am** Behavior of Soft 3D-Printed Auxetic Structures Under Various Loading Conditions  
Technical Paper Publication. IMECE2018-87859  
*Mahmoud Ardebili, Erik Chauca, The Borough of Manhattan Community College / CUNY, NEW YORK, NY, United States, Kerim Ikikardaslar, CCNY/CUNY, New York, NY, United States, Feridun Delale, The City College of New York, New York, NY, United States*

**11:20am** Phase Transitions In a Compressed CNT Forest With Atomic Layer Deposition  
Technical Presentation. IMECE2018-89020  
*Prashant K. Purohit, University of Pennsylvania, Philadelphia, PA, United States*

**11:35am** Unraveling the mechanical behavior of stochastic cellular materials at intermediate relative densities  
Technical Presentation. IMECE2018-89528  
*Antonia Antoniou, Georgia Institute of Technology, Atlanta, GA, United States*

**11:50am** Mechanical Properties of a 3D Cellular Structure with Semi-Closed Cells  
Technical Presentation. IMECE2018-89619  
*Hassan Bahaloo, Northeastern University, Boston, MA, United States, Masoud Olia, Wentworth Institute of Technology, Boston, MA, United States, Hamid Nayeb Hashemi, Northeastern Univ, Boston, MA, United States*

**12:05pm** 3D Printed Reconfigurable Hybrid Square Lattices for Unique Pattern Transformation under Bi-axial Compression  
Technical Presentation. IMECE2018-90037  
*Yaning Li, Yunyao Jiang, University of New Hampshire, Durham, NH, United States*

## **12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS**

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### **12-26-3 Mechanics of Soft Materials and Soft Robots**

**Room 329 10:50am - 12:35pm**

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Session Chair: **Shaoxing Qu, Zhejiang University, Hangzhou, Zhejiang, China**

**10:50am** Impact of the Chamber Shape on a Soft Actuator Mechanism to Mimic the Esophageal Swallowing Process

Technical Paper Publication. IMECE2018-86592  
*Alberto Caballero Ruiz, Juan Alejandro Hernandez Angulo, Gabriel Ascanio Gasca, Leticia Vega Alvarado, Leopoldo Ruiz Huerta, Universidad Nacional Autónoma de México (UNAM), Ciudad de México, Ciudad de México, Mexico, Edmundo Brito-de la Fuente, Protenius Kall Deutschland GmbH, Bad Homburg, Germany*

**11:11am** Integrated Curvature Sensing of Soft Bending Actuators Using Inertial Measurement Units

Technical Paper Publication. IMECE2018-87104  
*Arthur Seibel, Lars Schiller, Hamburg University of Technology, Hamburg, Germany*

**11:32am** Chemomechanically Controlled Inhomogeneous Large Deformation of a Bi-layered Spherical Hydrogel

Technical Presentation. IMECE2018-89154  
*Huiming Wang, Zhejiang University, Hangzhou, China*

**11:53am** Different Mechanical Responses of Soft Adhesion Layer by Partitioning and Initial Defects

Technical Presentation. IMECE2018-89233  
*Danming Zhong, Zhejiang University, Hangzhou, Zhejiang, China*

**12:14pm** Effects Of Defect Size On Cavitation In Gelatin

Technical Presentation. IMECE2018-89397  
*Yimou Fu, Zhejiang University, Hangzhou, Zhejiang, China*

## **12-27 MULTIFUNCTIONAL AND MICRO/NANO-STRUCTURED MATERIALS: MODELING AND CHARACTERIZATION**

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### **12-27-2 Multifunctional and Micro/Nano-structured Materials: Modeling and Characterization (II)**

**Third Floor, David L. Lawrence Convention Center, Room 336 10:50am - 12:35pm**

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Session Chair: **Xin-Lin Gao, Southern Methodist University, Dallas, TX, United States**

Session Co-Chair: **Vinu Unnikrishnan, The University of Alabama, Tuscaloosa, AL, United States**

**10:50am** Modelling of Fracture Mechanisms at the Nanoscale using the Atomistic J-Integral

Invented Presentation. IMECE2018-89174  
*Samit Roy, Univ Of Alabama, Tuscaloosa, AL, United States, Anubhav Roy, University of Alabama, Tuscaloosa, AL, United States*

**11:32am** Influence of Strain States on the Thermal Transport Properties of Single and Multiwalled Carbon Nanostructures

Technical Paper Publication. IMECE2018-88620  
*Sushan Nakarmi, University of Alabama, Tuscaloosa, AL, United States, Vinu Unnikrishnan, The University of Alabama, Tuscaloosa, AL, United States*

**11:53am** Study of Local Interfacial Dielectric Properties in Polymer Nanodielectrics from First Principles

Technical Presentation. IMECE2018-88061  
*Yumeng Li, University of Illinois At Urbana-Champaign, Urbana, IL, United States*

**12:14pm** “Band Gaps for Elastic Wave Propagation in a Periodic Composite Beam Structure Incorporating Surface Energy, Transverse Shear and Rotational Inertia Effects”

Technical Paper Publication. IMECE2018-87236  
*Robert Gao, Greenhill School, Addison, TX, United States, Gongye Zhang, Tindaro Ioppolo, Southern Methodist University, Dallas, TX, United States*

## **12-41 DYNAMIC FAILURE OF MATERIALS AND STRUCTURES**

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### **12-41-1 Dynamic Failure of Materials and Structures**

**Room 328 10:50am - 12:35pm**

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Session Chair: **L. Roy Xu, University of New Mexico, Albuquerque, NM, United States**

**10:50am** Combining Nanoindentation Tests and Computational Mechanics to Predict Impact Behavior of Composite Laminates

Technical Presentation. IMECE2018-86601  
*L. Roy Xu, University of New Mexico, Albuquerque, NM, United States, Mark Flores, AFRL, Dayton, OH, United States*

**11:11am Full Frontal Impact Comparison of Steel and Carbon Fiber Composite Front Bumper Crush Can (FBCC) Structures**

Technical Paper Publication. IMECE2018-87110

**Yash Dixit, Paul Begeman**, Wayne State University, DETROIT, MI, United States, **Golam Newaz**, Wayne State University, Ann Arbor, MI, United States, **Derek Board**, Ford Motor Company, Dearborn, MI, United States, **Yijung Chen**, Optimal CAE, Inc, Plymouth, MI, United States, **Omar Faruque**, Ford Motor Company, Dearborn, MI, United States

**11:32am Adhesive Joints Under Impacting Shock Wave Loading**

Technical Paper Publication. IMECE2018-87855

**Salih Yildiz, Yiannis Andreopoulos, Feridun Delale**, The City College of New York, New York, NY, United States

**11:53am Comparison of Interfacial and Continuum Models for Dynamic Fragmentation Analysis**

Technical Paper Publication. IMECE2018-88294

**Bahador Bahmani**, University of Tennessee, Knoxville, Tullahoma, TN, United States, **Reza Abedi**, University of Tennessee, Tullahoma, TN, United States, **Philip L. Clarke**, University of Tennessee, Knoxville, Tullahoma, TN, United States

**12-3 MECHANICAL CHARACTERIZATION IN EXTREME ENVIRONMENTS**

**12-3-3 Mechanical Characterization in Extreme Environments III**

**Room 330 2:05pm - 3:50pm**

Session Chair: **Natasha Vermaak**, Lehigh University, Bethlehem, PA, United States

Session Co-Chair: **Owen Kingstedt**, The University of Utah, Salt Lake City, UT, United States, **Ryan Berke**, Utah State University, Logan, UT, United States

**2:05pm Low Temperature Seawater Effects on the Mechanical, Fracture, and Dynamic Behavior of E-Glass and Carbon Fiber Laminates**

Technical Presentation. IMECE2018-90056

**James LeBlanc**, Naval Undersea Warfare Center - Division Newport, Newport, RI, United States, **Paul Cavallaro**, Naval Undersea Warfare Center, Newport, RI, United States, **Jahn Torres**, Naval Undersea Warfare Center, Division Newport, Newport, RI, United States, **Eric Warner**, Naval Undersea Warfare Center, Newport, RI, United States, **Andrew Hulton**, Naval Undersea Warfare Center Division Newport, Newport, RI, United States, **Ryan Saenger**, **David Ponte**, Naval Undersea Warfare Center - Division Newport, Newport, RI, United States

**2:26pm Development of a Single Walled Tank Under Cryogenic Conditions Made of Composite**

Technical Paper Publication. IMECE2018-86365

**Philipp Werner Kutz, Frank Otremba, Jan Werner, Christian Sklorz**, Bundesanstalt für Materialforschung und -prüfung, Berlin, Berlin, Germany

**2:47pm Analysis of Temperature Field and Stress Field on Brake Disc During Braking**

Technical Paper Publication. IMECE2018-86767

**Yu Liu, Xiandong Liu, Yingchun Shan, Tian He**, Beihang University, Beijing, China

**3:08pm Material properties of hybridized polymer matrix composites at sub-ambient temperatures**

Technical Presentation. IMECE2018-89709

**Matthew Mordasky, Xuemei Wang**, United Technologies Research Center, East Hartford, CT, United States, **Paul Cavallaro**, Naval Undersea Warfare Center, Newport, RI, United States, **Mahmoud M. Salama**, JPS Composite Materials, Anderson, SC, United States

**3:29pm "Mechanical Performance Analysis of UL-TEM 9085 in a Heated, Irradiated Environment"**

Technical Paper Publication. IMECE2018-88181

**Matthew Ng**, The Pennsylvania State University, State College, PA, United States, **Sean Brennan**, The Pennsylvania State University, University Park, PA, United States

**12-14 ANISOTROPIC PLASTICITY OF TEXTURED AND MICROSTRUCTURALLY HETEROGENEOUS MATERIALS**

**12-14-3 Numerical modeling with applications to forming**

**Room 331 2:05pm - 3:50pm**

Session Chair: **Nitin Chandola**, University of Florida, Shalimar, FL, United States

Session Co-Chair: **Oana Cazacu**, Univ Of Florida, Shalimar, FL, United States

**2:05pm Effect of the ratio between the yield stresses in uniaxial tension and pure shear on the size of the plastic zone near a crack**

Technical Presentation. IMECE2018-86083

**Benoit Revil-Baudard**, University of Florida, Shalimar, FL, United States, **Oana Cazacu**, Univ Of Florida, Shalimar, FL, United States, **Nitin Chandola**, University of Florida, Shalimar, FL, United States

**2:26pm Anisotropic Property of Dual-Phase Steel: Measurement and Simulation**

Technical Presentation. IMECE2018-89551

**Xin Wu, Pengyan Lu, Qingyu Yang**, Wayne State University, Detroit, MI, United States

**2:47pm Numerical Prediction of the Earing in the Cup Drawing of an AA3104 Aluminum Alloy: Process Conditions Versus Yield Criterion**

Technical Presentation. IMECE2018-88998

**Marta C. Oliveira**, University of Coimbra, Coimbra, Coimbra, Portugal, **Pedro D. Barros**, **Diogo M. Neto**, Department of Mechanical Engineering, University of Coimbra, Coimbra, Coimbra, Portugal, **Robert E. Dick**, Alcoa Technical Center, New Kensington, PA, United States, **JosÉ L. Alves**, Microelectromechanical Systems Research Unit, University of Minho, Guimaraes, Portugal, **Luís F. Menezes**, Department of Mechanical Engineering, University of Coimbra, Coimbra, Coimbra, Portugal

**3:08pm**      **Plasticity-damage couplings in polycrystalline materials: Importance of consideration of the specificities of the plastic flow of the matrix on the mechanical response of porous solids**

**Technical Presentation.** IMECE2018-86082

*Benoit Revil-Baudard, University of Florida, Shalimar, FL, United States, Oana Cazacu, Univ Of Florida, Shalimar, FL, United States*

## **12-16 MULTISCALE MODELING AND EXPERIMENTATION OF GEOMATERIALS**

**12-16-1 Multiscale Modeling and Experimentation of Geomaterials**

**Third Floor, David L. Lawrence Convention Center, Room 333      2:05pm - 3:50pm**

Session Chair: **Jesse Sherburn**, *US Army Engineer Research and Development Center, Vicksburg, MS, United States*

**2:05pm**      **Mesoscale Finite Element Modeling of Concrete Materials**

**Technical Presentation.** IMECE2018-86267

*William Lawrimore, Jay Shannon, US. Army ERDC, Vicksburg, MS, United States, M.Q. Chandler, USACE-ERDC, Vicksburg, MS, United States, Charles A. Burchfield, Zackery B. McClelland, US. Army ERDC, Vicksburg, MS, United States, R.D. Moser, US Army Engineer Research and Development Center, Vicksburg, MS, United States*

**2:26pm**      **Multi Scale Modeling of Rubber Friction on the Rough Pavements Using Finite Element Method**

**Technical Presentation.** IMECE2018-87724

*Ashkan Nazari, Arash Nouri, Saied Taheri, Maryam Shakiba, Sunish Vadakkeveetil, Virginia Tech, Blacksburg, VA, United States, Mehran Shams Kondori, Virginia Tech, Blacksburg, VA, United States*

**2:47pm**      **Statistical Volume Elements for the Characterization of Angle-Dependent Fracture Strengths**

**Technical Paper Publication.** IMECE2018-88257

*Justin Garrard, University of Tennessee Space Institute, Tullahoma, TN, United States, Reza Abedi, University of Tennessee, Tullahoma, TN, United States, Philip, L Clarke, University of Tennessee Space Institute, Tullahoma, TN, United States*

**3:08pm**      **Evaluation of a Computational Model for Ultra-High Performance Concrete in Shear**

**Technical Presentation.** IMECE2018-89022

*Andrew Groeneveld, US Army Engineer Research and Development Center, Vicksburg, MS, United States, M.Q. Chandler, USACE-ERDC, Vicksburg, MS, United States, Robert Walker, C. Kennan Crane, US Army Engineer Research and Development Center, Vicksburg, MS, United States*

## **12-20 MULTISCALE MECHANICS OF DUCTILE FAILURE**

**12-20-1 Multiscale Mechanics of Ductile Failure**

**Third Floor, David L. Lawrence Convention Center, Room 334      2:05pm - 3:50pm**

Session Chair: **Justin Wilkerson**, *Texas A&M University, College Station, TX, United States*

**2:05pm**      **How Plastic Anisotropy Influences Dynamic Failure in Magnesium Alloys**

**Technical Presentation.** IMECE2018-89751

*Jeffrey Lloyd, US Army Research Laboratory, Aberdeen Proving Ground, MD, United States*

**2:26pm**      **Multiscale Mechanics of Ductile Damage in HCP Materials**

**Technical Presentation.** IMECE2018-89292

*Padmeya Prashant Indurkar, National University of Singapore, Singapore, Singapore, Shailendra Joshi, University of Houston, Houston, TX, United States*

**2:47pm**      **On the orientation dependence of intergranular spall failure**

**Technical Presentation.** IMECE2018-89245

*Justin Wilkerson, thao nguyen, Texas A&M University, College Station, TX, United States, Darby Luscher, Los Alamos National Laboratory, Los Alamos, NM, United States*

**3:05pm**      **Dynamic work hardening and ductile fracture in porous metals**

**Technical Presentation.** IMECE2018-89284

*Xin Zhu Zheng, Texas A&M University, College Station, TX, United States, Komi Espoir N?souglo, University Carlos III of Madrid, LeganÈs, Spain, Shmuel Osovski, Technion ? Israeli Institute of Technology, Haifa, Israel, Jose Rodríguez-Martínez, University Carlos III of Madrid, LeganÈs, Spain, Ankit Srivastava, Texas A&M University, College Station, TX, United States*

**3:29pm**      **A comparative study of the dynamic fragmentation of non-linear elastic and elasto-plastic rings**

**Technical Presentation.** IMECE2018-89276

*ALVARO VAZ ROMERO SANTERO, UNIVERSITY CARLOS III OF MADRID, LEGANES, Madrid, Spain, Jose Rodríguez-Martínez, University Carlos III of Madrid, LeganÈs, Spain, SÈbastien Mercier, Alain Molinari, University of Lorraine, METZ, LORRAINE, France*

## **12-21 SYMPOSIUM ON MODELING OF THE FRACTURE, FAILURE AND FATIGUE IN SOLIDS**

**12-21-5 Uncertainty Modeling in Fracture and Fatigue**

**Fourth Floor, David L. Lawrence Convention Center, Room 404      2:05pm - 3:50pm**

Session Chair: **Sevan Goenezen**, *Texas A&M University, College Station, TX, United States*

Session Co-Chair: **Bahador Bahmani**, *University of Tennessee, Knoxville, Tullahoma, TN, United States*

**Draft Program**

**2:05pm** Accelerating hierarchical materials discovery and design through a combined machine learning and experimental framework

Technical Presentation. IMECE2018-89376

*Grace X. Gu, UC Berkeley, Berkeley, CA, United States, Chun-Teh Chen, Deon Richmond, Markus Buehler, MIT, Cambridge, MA, United States*

**2:26pm** Establishing Uncertainty Quantification and Propagation Techniques within a Process-Structure-Property framework for Uncertainty Informed Materials Design and Development

Technical Presentation. IMECE2018-89201

*Gary Whelan, Georgia Institute of Technology, Atlanta, GA, United States, David L McDowell, Georgia Institute of Technology, Atlanta, GA, United States*

**2:47pm** An Integrated Approach for Statistical Microscale Homogenization to Macroscopic Dynamic Fracture Analysis

Technical Paper Publication. IMECE2018-88429

*Bahador Bahmani, University of Tennessee, Knoxville, Tullahoma, TN, United States, Ming Yang, Anand Nagarajan, The Ohio State University, Columbus, OH, United States, Philip L. Clarke, University of Tennessee, Knoxville, Tullahoma, TN, United States, Soheil Soghrati, the Ohio State University, Dublin, OH, United States, Reza Abedi, University of Tennessee, Tullahoma, TN, United States*

**3:08pm** Utilizing Surface Displacement Fields from a Digital Image Correlation System and Inverse Algorithms to Map the Spatial Distribution of the Shear Modulus in 3D

Technical Presentation. IMECE2018-89386

*Sevan Goenezen, Texas A&M University, College Station, TX, United States, Yue Mei, Swansea University, Swansea, United Kingdom, Ping Luo, Baik Jin Kim, Maulik Kotecha, Texas A&M University, college STation, TX, United States*

## **12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS**

### **12-26-4 Mechanics of Soft Materials and Soft Robots**

**Room 329 2:05pm - 3:50pm**

Session Chair: *Shaoxing Qu, Zhejiang University, Hangzhou, Zhejiang, China*

**2:05pm** Programmable Multi-functional Soft Robot blends into the background

Technical Presentation. IMECE2018-89144

*Zhanan Zou, Jianliang Xiao, University of Colorado Boulder, Boulder, CO, United States, Kai Yu, university of colorado denver, denver, CO, United States*

**2:26pm** Mechanics-guided Design of Active Material: Hard-Magnetic Soft Actuator

Technical Presentation. IMECE2018-89291

*Ruike Zhao, MIT, Cambridge, MA, United States, Yoonho Kim, Massachusetts Institute of Technology, Cambridge, MA, United States, Shawn Chester, New Jersey Institute of Technology, North Caldwell, NJ, United States, Xuanhe Zhao, MIT, Cambridge, MA, United States*

**2:47pm** Soft Electrically Actuated Actuators for Untethered Soft Robots

Technical Presentation. IMECE2018-89644

*Xiaonan Huang, Kitty Kumar, Carnegie Mellon University, Pittsburgh, PA, United States, Mohammad Khalid Jawed, University of California, Los Angeles, Los Angeles, CA, United States, Amir M. Nasab, University of Nevada, Reno, Reno, NV, United States, Zisheng Ye, Carnegie Mellon University, Pittsburgh, PA, United States, Wanliang Shan, University of Nevada Reno, Reno, NV, United States, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States*

**3:08pm** A soft origami robot driven by electrostatic forces

Technical Presentation. IMECE2018-89905

*Jisen Li, Department of Mechanical Engineering, Singapore, Singapore, Hareesh Godaba, National University of Singapore, Singapore, Singapore, Zhiqian Zhang, Choon Chiang Foo, Institute of High Performance Computing, Singapore, Singapore, Jian Zhu, National University of Singapore, Singapore, Singapore*

**3:29pm** A Thermosensitive Chameleon Hydrogel Fabric with Fast Response, Good Reversibility and Adjustable Temperature Sensitivity

Technical Presentation. IMECE2018-89273

*Tonghao Wu, Tenghao Yin, Zhejiang University, Hangzhou, Zhejiang, China*

## **12-27 MULTIFUNCTIONAL AND MICRO/NANO-STRUCTURED MATERIALS: MODELING AND CHARACTERIZATION**

### **12-27-3 Multifunctional and Micro/Nano-structured Materials: Modeling and Characterization (III)**

**Third Floor, David L. Lawrence Convention Center, Room 336 2:05pm - 3:50pm**

Session Chair: *Xin-Lin Gao, Southern Methodist University, Dallas, TX, United States*

**2:05pm** Pave the Path for New Architected Materials via Multi-Material 3D Printing

Technical Presentation. IMECE2018-90036

*Yaning Li, University of New Hampshire, Durham, NH, United States*

**2:26pm** Two Extended Versions of Hill's Lemma Based on the Modified Couple Stress Theory

Technical Presentation. IMECE2018-88198

*Ahmad Gad, Xin-Lin Gao, Southern Methodist University, Dallas, TX, United States*

**2:47pm** Mechanically Mediated Asymmetric Thermal Transports in In-Plane Heterostructures

Technical Presentation. IMECE2018-89065

*Yuan Gao, University of Virginia, Charlottesville, VA, United States, Baoxing Xu, University of Virginia, School of Engineering and Applied Sciences, Charlottesville, VA, United States*

**3:08pm Average Behavior of Nonlinear Magneto-electro-elastic Particulate Composites**

Technical Presentation. IMECE2018-86970

*You-shu Zhan, Chien-hong Lin, National Cheng Kung University, Tainan, Select State/Province, Taiwan*

**3:29pm A Microstructure-Based Modeling Approach for Electrostriction in Relaxor Ferroelectric Polymers**

Technical Presentation. IMECE2018-89912

*Anil Erol, The Pennsylvania State University, University Park, PA, United States, Paris Von Lockette, Penn State University, University Park, PA, United States*

**12-30 SYMPOSIUM ON MULTIPHYSICS SIMULATIONS AND EXPERIMENTS FOR SOLIDS**

**12-30-1 Symposium on Multiphysics Simulations and Experiments for Solids**

**Third Floor, David L. Lawrence Convention Center, Room 335 2:05pm - 3:50pm**

Session Chair: *Qian Qian, University of Texas at Dallas, Richardson, TX, United States*

**2:05pm Multiscale, Data-Driven Process-Structure-Property Modeling for Additive Manufacturing in Metals - Part 1**

Technical Presentation. IMECE2018-89263

*Gregory Wagner, Zhengtao Gan, Yanping Lian, Northwestern University, Evanston, IL, United States, Wing Liu, Northwestern Univ, Evanston, IL, United States*

**2:26pm Multiscale, Data-Driven Process-Structure-Property Modeling for Additive Manufacturing in Metals - Part 2**

Technical Presentation. IMECE2018-89264

*Gregory Wagner, Zhengtao Gan, Yanping Lian, Northwestern University, Evanston, IL, United States, Wing Liu, Northwestern Univ, Evanston, IL, United States*

**2:47pm Influence of lattice mismatch and nucleation anisotropy on inoculating efficiency at various cooling rates: insights into grain refinement of additively manufactured metals**

Technical Presentation. IMECE2018-89455

*Zhuo Wang, Mississippi state university, Starkville, MS, United States, Yaohong Xiao, Mississippi State University, Mississippi State, MS, United States, Lei Chen, Mississippi State University, Starkville, MS, United States*

**3:08pm Stress Corrosion Cracking Effects in a Rolled Homogeneous Armor Steel Alloy**

Technical Presentation. IMECE2018-89636

*Brian Sprow, Center for Advanced Vehicular Systems, Starkville, MS, United States, Luke Peterson, Mississippi State University, Starkville, MS, United States, Lydia Jordan, Center for Advanced Vehicular Systems, Starkville, MS, United States*

**3:29pm A Multi-Temporal Scale Approach To Thermomechanical Fatigue Failure Prediction**

Technical Presentation. IMECE2018-89262

*Rui Zhang, The University of Texas at Dallas, Richardson, TX, United States, Lihua Wen, Northwestern Polytechnical University, XI'AN, Shaanxi, China, Qian Qian, University of Texas at Dallas, Richardson, TX, United States*

**12-41 DYNAMIC FAILURE OF MATERIALS AND STRUCTURES**

**12-41-2 Dynamic Failure of Materials and Structures**

**Room 328 2:05pm - 3:50pm**

Session Chair: *L. Roy Xu, University of New Mexico, Albuquerque, NM, United States*

**2:05pm Couple Diffusion-Thermo-Mechanical Model for Life Prediction of a Turbine Engine Blade**

Technical Paper Publication. IMECE2018-88461

*Samir Naboulsi, AFRL - DSRC; Engility, Beavercreek, OH, United States*

**2:26pm Modeling of Dynamic Failure of Metals at the Atomic Scales and the Mesoscales**

Technical Presentation. IMECE2018-88749

*Avinash Dongare, University of Connecticut, Storrs, CT, United States*

**2:47pm Modeling on Fracture of Core-Shell Structured Si Nanoparticles During Charging/Discharging Cycling**

Technical Presentation. IMECE2018-89123

*Xiang Gao, Beihang University (BUAA), Beijing, China, Jun Xu, Chunhao Yuan, Beihang University, Beijing, China*

**12-14 ANISOTROPIC PLASTICITY OF TEXTURED AND MICROSTRUCTURALLY HETEROGENEOUS MATERIALS**

**12-14-4 Experimental and theoretical models for anisotropic plasticity and fracture**

**Fourth Floor, David L. Lawrence Convention Center, Room 402 4:00pm - 5:45pm**

Session Chair: *Oana Cazacu, Univ Of Florida, Shalimar, FL, United States*

Session Co-Chair: *H. Eliot Fang, Sandia National Laboratories, Albuquerque, NM, United States*

**4:00pm ANISOTROPIC FRACTURE CRITERION FOR METALS**

Invited Presentation. IMECE2018-88780

*Jeong Whan Yoon, KAIST, DAEJEON, Korea (Republic)*

**4:42pm Theoretical and Numerical Formulation of an Efficient Anisotropic Distortional Hardening Model**

Technical Presentation. IMECE2018-87968

*Brian Lester, William Scherzinger, Sandia National Laboratories, Albuquerque, NM, United States*

**5:03pm** An experimental investigation on the tensile deformation and diffuse necking of an anisotropic bar

**Technical Presentation.** IMECE2018-87893

*Wei Tong, Xu Nie, Southern Methodist University, Dallas, TX, United States, Bo Song, Sandia National Laboratories, Albuquerque, NM, United States*

**5:24pm** Prediction of plastic flow localization with shell element in thick AHSS sheets

**Technical Presentation.** IMECE2018-86535

*Minsu Wi, JaeHyun Choi, Frederic Barlat, Postech, Pohang, Gyeongbuk, Korea (Republic)*

## **12-16 MULTISCALE MODELING AND EXPERIMENTATION OF GEOMATERIALS**

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**12-16-2 Multiscale Modeling and Experimentation of Geomaterials**

**Third Floor, David L. Lawrence Convention Center, Room 333 4:00pm - 5:45pm**

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Session Chair: **William Lawrimore**, *US Army Engineer Research and Development Center, Vicksburg, MS, United States*

**4:00pm** Failure Prediction Using Gibbs Formulation of Granular Micromechanics

**Technical Presentation.** IMECE2018-89206

*Anil Misra, Rizacan Sarikaya, University of Kansas, Lawrence, KS, United States, Payam Poorolajouy, Purdue University, West Lafayette, IN, United States*

**4:21pm** New Penetration Models for Ballistic Clay Incorporating Strain Hardening, Rate Dependence and Temperature Effects

**Technical Presentation.** IMECE2018-89622

*Yongqiang Li, Xin-Lin Gao, Southern Methodist University, Dallas, TX, United States, Adam Fournier, Program Executive Office - Soldier, Fort Belvoir, VA, United States, Ricardo Vega, NCI Inc., Fort Belvoir, VA, United States*

**4:42pm** Modeling of Ultra-High Performance Concrete Flyer Plate Experiments

**Technical Presentation.** IMECE2018-89898

*Jesse Sherburn, US Army Engineer Research and Development Center, Vicksburg, MS, United States, William F. Heard, U.S. Army ERDC, Vicksburg, MS, United States*

**5:03pm** Discrete Element Method Simulations of Fracture in Concrete

**Technical Presentation.** IMECE2018-89966

*T.W. Stone, Mississippi State University, Center for Advanced Vehicular Systems (CAVS), Starkville, MS, United States, Tyrone McDonald, Bohumir Jelinek, Mississippi State University/Center for Advanced Vehicular Systems, Starkville, MS, United States*

## **12-20 MULTISCALE MECHANICS OF DUCTILE FAILURE**

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**12-20-2 Multiscale Mechanics of Ductile Failure**

**Third Floor, David L. Lawrence Convention Center, Room 334 4:00pm - 5:45pm**

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Session Chair: **Justin Wilkerson**, *Texas A&M University, College Station, TX, United States*

**4:00pm** Modeling the Nucleation, Growth and Coalescence Behavior of Voids during Spall Failure of AI Microstructures at Mesoscales using Quasi-Coarse-Grained Dynamics (QCGD) Simulations

**Technical Presentation.** IMECE2018-89921

*Garvit Agarwal, Avinash Dongare, University of Connecticut, Storrs, CT, United States*

**4:21pm** Dynamic Failure of nanostructured metals with supersaturated vacancies

**Technical Presentation.** IMECE2018-89901

*Sara Adibi, Texas A&M University, AUSTIN, TX, United States, Justin Wilkerson, Texas A&M University, College Station, TX, United States*

**4:42pm** Prediction of Strain Rate, Stress State, and Temperature Dependent Plasticity and Damage Evolution in an Aluminum 7085-T711 Alloy Using an Internal State Variable Based Constitutive Model

**Technical Presentation.** IMECE2018-89318

*Luke Peter, Mississippi State University, Starkville, MS, United States, Mar-Horst Meyer, Mississippi State Univ, Starkville, MS, United States, Thomas L. Lucy, Mississippi State University, Mississippi State University, MS, United States*

**5:03pm** Ductile fracture of multiphase steel sheets under bending

**Technical Presentation.** IMECE2018-89304

*Yu Liu, Ankit Srivastava, Texas A&M University, College Station, TX, United States*

**5:24pm** Finite-Strain Homogenization Models for Viscoplastic Polycrystals Incorporating Void Growth and Texture Evolution

**Technical Presentation.** IMECE2018-89409

*Shuvrangu Das, Dawei Song, Pedro Ponte Castañeda, University of Pennsylvania, Philadelphia, PA, United States*

## **12-26 MECHANICS OF SOFT MATERIALS AND SOFT ROBOTS**

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**12-26-5 Mechanics of Soft Materials and Soft Robots**

**Room 329 4:00pm - 5:45pm**

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Session Chair: **Shaoxing Qu**, *Zhejiang University, Hangzhou, Zhejiang, China*

**4:00pm**      **Thin Film Electrostatic-Actuator-Based Soft Robots**

**Technical Presentation.** IMECE2018-89353

*Congran Jin, Dartmouth College, HANOVER, NH, United States, Jinhua Zhang, Xi'an Jiaotong University, Xi'an, Shanxi, China, Shicheng Huang, Ian Trase, Zhe Xu, John X.J. Zhang, Zi Chen, Dartmouth College, Hanover, NH, United States*

**4:21pm**      **Shape controllable soft bilayer pneumatic actuators**

**Technical Presentation.** IMECE2018-89355

*Yinding Chi, Temple University, Philadelphia, PA, United States, Jie Yin, Temple U, Haverford, PA, United States*

**4:42pm**      **Switchable Adhesion Actuator for Amphibious Climbing Soft Robot**

**Technical Presentation.** IMECE2018-89443

*Yichao Tang, Temple University, Philadelphia, PA, United States, Jie Yin, Temple U, Haverford, PA, United States*

**5:03pm**      **Hybrid Liquid Metal-Microelectronics Sensor Skin Integration for Soft Robots**

**Technical Presentation.** IMECE2018-89643

*Tess Hellebrekers, Kadri Bugra Ozutemiz, Jessica Yin, Carmel Majidi, Carnegie Mellon University, Pittsburgh, PA, United States*

**5:24pm**      **Bioinspired Design of Thermally-driven Vascular Artificial Muscle**

**Technical Presentation.** IMECE2018-89147

*Shengqiang Cai, UC San Diego, La Jolla, CA, United States*

**12-27 MULTIFUNCTIONAL AND MICRO/NANO-STRUCTURED MATERIALS: MODELING AND CHARACTERIZATION**

**12-27-4 Multifunctional and Micro/Nano-structured Materials: Modeling and Characterization (IV)**

**Room 331      4:00pm - 5:45pm**

Session Chair: **Xin-Lin Gao**, Southern Methodist University, Dallas, TX, United States

Session Co-Chair: **Haifeng Zhao**, Chinese Academy of Sciences, Beijing, China

**4:00pm**      **Simulation of Mouse Brain Tissue Under Controlled Cortical Impact**

**Technical Paper Publication.** IMECE2018-88790

*Haifeng Zhao, Chinese Academy of Sciences, Beijing, China, Changxin Lai, SJTU, Shanghai, China, Ke Wang, Chinese Academy of Sciences, Beijing, China, Suhao Qiu, Shanghai Jiao Tong University, Shanghai, China, Tianyao Wang, The Fifth People's Hospital of Shanghai, Shanghai, China, Wenheng Jiang, Soochow University, Shanghai, China, Jun Liu, The Fifth People's Hospital of Shanghai, Fudan University, Shanghai, China, Xiangdong Li, First affiliated hospital of Soochow university, Shanghai, China, Jianfeng Zeng, Soochow University, Suzhou, China, Yuan Feng, Shanghai Jiao Tong University, Shanghai, China*

**4:21pm**      **A Finite Element Approach for Study of Wave Attenuation Characteristics of Epoxy Polymer Composite**

**Technical Paper Publication.** IMECE2018-87873

*Shank S. Kulkarni, University of North Carolina at Charlotte, Charlotte, NC, United States, Alireza Tabarraei, University of North Carolina Charlotte, Charlotte, NC, United States, Pratik Ghag, University of North Carolina at Charlotte, Charlotte, NC, United States*

**4:42pm**      **Dynamic behavior of cellular graphene aerogel**

**Technical Presentation.** IMECE2018-89366

*Zihao Yuan, Chinese Academy of Science, Beijing, China, Haifeng Zhao, Chinese Academy of Sciences, Beijing, China*

**5:03pm**      **Computational Modeling of Head Injuries Induced by Golf Ball Impacts**

**Technical Presentation.** IMECE2018-87229

*Yongqiang Li, Xin-Lin Gao, Southern Methodist University, Dallas, TX, United States*

**12-30 SYMPOSIUM ON MULTIPHYSICS SIMULATIONS AND EXPERIMENTS FOR SOLIDS**

**12-30-2 Symposium on Multiphysics Simulations and Experiments for Solids**

**Third Floor, David L. Lawrence Convention Center, Room 335      4:00pm - 5:45pm**

Session Chair: **Rui Zhang**, The University of Texas at Dallas, Richardson, TX, United States

**4:00pm**      **Modeling the Behavior of Heterogeneous Systems Subjected to the Coupled Effects of Electromagnetic and Mechanical Fields**

**Technical Presentation.** IMECE2018-89566

*Mohamed Elbadry, Michael Steer, North Carolina State University, Raleigh, NC, United States, Mohammed Zikry, North Carolina State Univ, Raleigh, NC, United States*

**4:21pm**      **Modeling nano-architected electrodes with elastic instabilities: The role of buckling on electrochemical performance.**

**Technical Presentation.** IMECE2018-89238

*Claudio Di Leo, Arman Afshar, Georgia Tech, Atlanta, GA, United States, Xiaoxing Xia, Caltech, Pasadena, CA, United States, Julia R. Greer, California Institute of Technology, Pasadena, CA, United States*

**4:42pm**      **Heat Built Up During Dynamic Mechanical Analysis (DMA) Testing of Rubber Specimens**

**Technical Paper Publication.** IMECE2018-88627

*Roja Esmaeeli, University of Akron, Akron, OH, United States, Ashkan Nazari, Virginia Tech, Blacksburg, VA, United States, Haniph Aliniagerdroudbari, Seyed Reza Hashemi, University of Akron, Akron, OH, United States, Muapper Alhadri, Waleed Zakri, the university of Akron, Akron, OH, United States, Siamak Farhad, University of Akron, Akron, OH, United States*

**5:03pm** Simulating Eddy Current Sensors in Blade Tip Timing Application: Modeling and Experimental Validation  
Technical Paper Publication. IMECE2018-87414

*Nidhal Jamia, Michael I. Friswell, Swansea University, Bay Campus, Swansea, United Kingdom, Sami EL-Borgi, Prakash Rajendran, Texas A&M University At Qatar, Doha, Qatar*

**5:24pm** Mechanics of non-collagenous interfaces in bone

Technical Presentation. IMECE2018-89438

*Yang Wang, The University of Texas at Dallas, Richardson, TX, United States, Seyedreza Mosali, University of Texas at Dallas, Richardson, TX, United States, Zhengwei Dai, Jiaxing University, Jiaxing, China, Majid Minary, The University of Texas At Dallas, Richardson, TX, United States, Qian Qian, University of Texas at Dallas, Richardson, TX, United States*

## **12-32 HIGH-PERFORMANCE NANOSTRUCTURAL MATERIALS AND NANOCOMPOSITES**

**12-32-1 High-Performance Nanostructural Materials and Nanocomposites**

**Room 328 4:00pm - 5:45pm**

Session Chair: *Yuris Dzenis, Univ Of Nebraska, Lincoln, NE, United States*

**4:00pm** Effect of Graphene on Mechanical Performance of Pin-Loaded Circular Hole in Laminated Composites  
Technical Paper Publication. IMECE2018-87566

*Olanrewaju Aluko, University of Michigan Flint, Flint, MI, United States*

**4:15pm** Atomistic Simulations of Mechanical Properties of Circular and Collapsed Carbon Nanotubes With Covalent Cross-Links

Technical Paper Publication. IMECE2018-88172

*Alexey Volkov, University of Alabama, Tuscaloosa, AL, United States, Arun Thapa, The University of Alabama, Tuscaloosa, AL, United States*

**4:30pm** Learning from Nature: Use Material Architecture to Break the Performance Tradeoffs in Bulk Materials

Technical Presentation. IMECE2018-89685

*Zian Jia, Stony Brook University, Setauket, NY, United States, Yang Yu, Beijing Institute of Technology, Beijing, China, Shaoyu Hou, Lifeng Wang, Stony Brook University, Stony Brook, NY, United States*

**4:45pm** Effect of Crystallizability on Mechanical Properties of Continuous Polymer Nanofibers

Technical Presentation. IMECE2018-89829

*Yan Zou, University of Nebraska - Lincoln, Lincoln, NE, United States, Dimitry Papkov, University of Nebraska-Lincoln, Lincoln, NE, United States, Yuris Dzenis, Univ Of Nebraska, Lincoln, NE, United States*

**5:00pm** Ultrastrong/Tough Continuous Bionanofibers

Technical Presentation. IMECE2018-89847

*Mohammad Andalib, University of Nebraska-Lincoln, Lincoln, NE, United States, Yuris Dzenis, Univ Of Nebraska, Lincoln, NE, United States*

**5:15pm** Incorporating Electrospun Nanofibers into Structural High-Temperature Nanocomposites

Technical Presentation. IMECE2018-89926

*Taylor Stockdale, Dimitry Papkov, University of Nebraska-Lincoln, Lincoln, NE, United States, Mohammad N. Andalib, University of Nebraska - Lincoln, Lincoln, NE, United States, Yuris Dzenis, Univ Of Nebraska, Lincoln, NE, United States*

## **Micro- and Nano-Systems Engineering and Packaging**

**WEDNESDAY, NOVEMBER, 14**

### **13-2 PLENARY PRESENTATIONS IN MEMS/NEMS ENGINEERING AND PACKAGING**

**13-2-1 Micro- and Nano-Systems Engineering and Packaging Plenary I**

**Third Floor, David L. Lawrence Convention Center, Room 301 9:00am - 9:45am**

**9:00am** The role of arrayed sensor systems-on-chip in next-generation MEMS inertial sensing  
Plenary Presentation. IMECE2018-90106

*Gary Fedder, Carnegie Mellon University, Pittsburgh, PA, United States*

### **13-3 DESIGN AND FABRICATION, ANALYSIS, PROCESSES AND TECHNOLOGY FOR MICRO AND NANO DEVICES AND SYSTEMS**

**13-3-1 Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems I**

**Fourth Floor, David L. Lawrence Convention Center, Room 406 10:00am - 11:45am**

Session Chair: *Po-hao Huang, University Of Arkansas, Fayetteville, AR, United States*

**10:00am** Rapid Preparation of BiOCl/BiOI for Degradation of Tartrazine and Pharmaceuticals Under Simulated Solar and LED Visible Light Irradiation

Technical Paper Publication. IMECE2018-86913

*Ukoha Emekwo, Purdue Water Institute/ Purdue University Northwest, Hammond, IN, United States, A. G. Agwu Nnanna, University of Texas of the Permian Basin, Odessa, TX, United States, John D. Vargo, Nicholas Baumhover, State Hygienic Laboratory at the University of Iowa, Coralville, IA, United States*

**10:21am Micro-Mechanical Punching By A Double-Sided Hot Embossing Process**

Technical Presentation. IMECE2018-89096

*Devanda Lek, Joseph Miller, In-Hyounk Song, Texas State University, San Marcos, TX, United States, Du Hwan Chun, Yeungnam Univ, Gyongsan, Korea (Republic), Byoung Hee You, Texas State University-San Marcos, San Marcos, TX, United States*

**10:42am Strain-Amplifying Cellular Microstructure for Flexible Piezo-Powered Actuator**

Technical Presentation. IMECE2018-89556

*E.J. Carron, University of Delaware, Newark, DE, United States, R. Valery Roy, Univ Of Delaware, Newark, DE, United States*

**11:03am Fabrication of Hair-Like Surface Nanostructures on Elastomeric Films for Highly Sensitive Resistive Pressure sensors**

Technical Presentation. IMECE2018-89934

*Kwanoh Kim, Eunju Yeo, Minhee Son, Jae Sung Yoon, Korea Institute of Machinery and Materials, Daejeon, Korea (Republic), Yeong-Eun Yoo, Korea Insistute of Machinery and Materials, Daejeon, Korea (Republic), Jeong Hwan Kim, Doo-Sun Choi, Korea Institute of Machinery and Materials, Daejeon, Korea (Republic)*

**11:24am Progress in process development of tantalum thin film as a micro/nanoscale structural material**

Technical Presentation. IMECE2018-89952

*Longchang Ni, Ryan Pocratsky, Maarten De Boer, Carnegie Mellon University, Pittsburgh, PA, United States*

**13-3 DESIGN AND FABRICATION, ANALYSIS, PROCESSES, AND TECHNOLOGY FOR MICRO AND NANO DEVICES AND SYSTEMS**

**13-3-2 Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems II**

**Fourth Floor, David L. Lawrence Convention Center, Room 406 1:45pm - 3:30pm**

Session Chair: *Byoung Hee You, Texas State University-San Marcos, San Marcos, TX, United States*

**1:45pm Methods of Mass-Flow Characterization of Water-Glycol Mixtures Through Micro/Nano-Channels**

Technical Paper Publication. IMECE2018-87928

*John B. Lee, Po-hao Huang, University of Arkansas, Fayetteville, AR, United States*

**2:06pm Design and Fabrication of a Microfluidic Module for Solid Phase Extraction of Nucleic Acids and Affinity Selection of Exosomes**

Technical Presentation. IMECE2018-88293

*Daniel Park, Louisiana State Univ, Baton Rouge, LA, United States, J. M. Jackson, C. D. M. Campos, S. A. Soper, University of Kansas, Lawrence, KS, United States, Michael Murphy, Louisiana State University, Baton Rouge, LA, United States*

**2:27pm Fabrication of Optically Transparent, Superhydrophobic Films on Plastic Surfaces from Raspberry-Shaped Particles**

Technical Presentation. IMECE2018-88462

*Xiaoxiao Zhao, Louisiana State University, Baton Rouge, LA, United States, Daniel Park, Louisiana State Univ, Baton Rouge, LA, United States, Michael Murphy, Louisiana State University, Baton Rouge, LA, United States*

**2:48pm Wormlike Micellar Solutions Passing through a Sudden Contraction Microchannel**

Technical Presentation. IMECE2018-89345

*Emad Jafari Nodoushan, Texas State University, San Marcos, TX, United States, Taeil Yi, Kyungnam University, Changwon, Gyeongsangnam-do, Korea (Republic), Young Ju Lee, Namwon Kim, Texas State University, San Marcos, TX, United States*

**3:09pm Demonstrating the Potential of a Hybrid Model to Increase the 360 Degrees Rotational Motion Freedom of Ironless Permanent Magnet Planar Motors**

Technical Paper Publication. IMECE2018-87007

*Ding Yuan, Ming Zhang, Yu ZHU, XIN LI, Leijie Wang, Tsinghua University, Beijing, China*

**13-4 COMPUTATIONAL STUDIES ON MEMS AND NANOSTRUCTURES**

**13-4-1 Computational Studies on MEMS and Nanostructures I**

**Fourth Floor, David L. Lawrence Convention Center, Room 406 3:45pm - 5:00pm**

Session Chair: *Grzegorz (Greg) Hader, U.S. Army RDECOM-ARDEC, Picatinny Arsenal, NJ, United States*

**3:45pm Effect of Polydispersity on the Morphology of P3HT:PCBM Organic Solar Cells by Coarse-grained Molecular Simulations**

Technical Presentation. IMECE2018-86439

*Joydeep Munshi, Lehigh University, Bethlehem, PA, United States, Wei Chen, Northwestern University, Evanston, IL, United States, TeYu Chien, University of Wyoming, Laramie, WY, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States*

**4:06pm Electrostatic Doping Based Graphene Nanoribbon Tunneling Transistor: A Simulation Study**

Technical Presentation. IMECE2018-86608

*Weixiang Zhang, SUNY At Buffalo, Buffalo, NY, United States, Tarek Ragab, Arkansas State University, State University, AR, United States, Cemal Basaran, State Univ Of New York at Buffalo, Buffalo, NY, United States*

**4:27pm Biomimetic Membrane Simulation for Water Desalination**

Technical Paper Publication. IMECE2018-86664

*Peter Oviroh, Rokhsareh Akbarzadeh, University of Johannesburg, Johannesburg, Select State/Province, South Africa, Tien-Chien Jen, Univ Of Johannesburg, Johannesburg, South Africa*

**Draft Program**

**4:48pm Multiscale Modeling of PEEK using Reactive Molecular Dynamics Modeling and Micromechanics**  
**Technical Presentation.** IMECE2018-88935

*Will Pisani, Matthew Radue, Michigan Technological University, Houghton, MI, United States, Sorayot Chinkanjanarot, National Metals and Materials Technology Center, Khlong Nueng, Pathum Thani, Thailand, Brett A. Bednarczyk, Evan Pineda, NASA Glenn Research Center, Cleveland, OH, United States, Kevin Waters, Ravindra Pandey, Julie King, Michigan Technological University, Houghton, MI, United States, Gregory Odegard, Michigan Tech Univ, Houghton, MI, United States*

## THURSDAY, NOVEMBER, 15

### 13-2 PLENARY PRESENTATIONS IN MEMS/NEMS ENGINEERING AND PACKAGING

#### 13-2-2 Micro- and Nano-Systems Engineering and Packaging Plenary II

**Third Floor, David L. Lawrence Convention Center, Room 303 8:00am - 8:45am**

**8:00am 2D Materials, Flexible Electrodes and Surfaces**  
**Plenary Presentation.** IMECE2018-90107  
*Eui-Hyeok Yang, Stevens Inst of Tech, Hoboken, NJ, United States*

### 13-1 GENERAL TOPICS OF MEMS/NEMS

#### 13-1-1 General Topics of MEMS/NEMS

**Room 338 8:55am - 10:40am**

Session Chair: **Jong Hyun Choi, Purdue University, West Lafayette, IN, United States**

**8:55am Experimental & Thermal Investigation of Flow Behavior in Mini Channel Heat Sink**  
**Technical Presentation.** IMECE2018-88924  
*Harshit M. Trivedi, ITM Universe, Vadodara, Gujarat, India*

**9:16am Preliminary Exploration of Cell-Based SAW Detection for Water Toxicity**  
**Technical Paper Publication.** IMECE2018-86436  
*Kun-Lin Lee, The City College of New York, New York, NY, United States, Fang Li, New York Institute of Technology, New York, NY, United States, Anis Nurashikin Nordin, International Islamic University Malaysia, Kuala Lumpur, Malaysia, Ioana Voiculescu, The City College of New York, New York, NY, United States*

**9:37am Mechanical Properties of 3D Printed Metals**  
**Technical Paper Publication.** IMECE2018-86310  
*Seyed Allameh, Northern Kentucky Univ, Newport, KY, United States, Bailey Leininger, Brianna Harbin, Northern Kentucky University, Highland Heights, KY, United States*

**9:58am Additively manufactured sensors and heat exchangers for gas flow using novel binder jet processing**  
**Technical Presentation.** IMECE2018-89570

*Xiaolu Huang, Truong Do, Tyler J. Bauder, Hawke Suen, Patrick Kwon, Junghoon Yeom, Michigan State University, East Lansing, MI, United States*

### 13-4 COMPUTATIONAL STUDIES ON MEMS AND NANOSTRUCTURES

#### 13-4-2 Computational Studies on MEMS and Nanostructures II

**Fourth Floor, David L. Lawrence Convention Center, Room 401 10:50am - 12:35pm**

Session Chair: **Grzegorz (Greg) Hader, U.S. Army RDECOM-ARDEC, Picatinny Arsenal, NJ, United States**

**10:50am Micro-cantilever beam battery for measurement of viscosity in extremely small volumes of fluid**  
**Invited Presentation.** IMECE2018-86522  
*Amin Changizi, Intelliquip, Breinigsville, PA, United States, M.Amin Changizi, Intelliquip, Bethlehem, PA, United States, Ion Stiharu, Concordia Univ, Montreal, QC, Canada*

**11:32am Simulation of Fluid Flow in a Micro-channel at Low Reynolds Number Using Dissipative Particle Dynamics**  
**Technical Paper Publication.** IMECE2018-87622  
*Waqas Waheed, Khalifa University, Abu Dhabi, United Arab Emirates, Anas Alzaman, Khalifa University of Science, Technology & Research (KUSTAR), Abu Dhabi, United Arab Emirates, Ashraf Al-Khateeb, Eiyad Abu-Nada, Khalifa University, Abu Dhabi, United Arab Emirates.*

**11:53am Capillary-Controlled Thermal Diode in Heterogeneous Nanoporous Structures**  
**Technical Presentation.** IMECE2018-89713  
*Tadeh Avanesian, Gisuk Hwang, Evan Boutz, Wichita State University, Wichita, KS, United States*

### 13-6 MICRO AND NANO DEVICES

#### 13-6-1 Micro/Nano Materials and Devices

**Room 338 10:50am - 12:35pm**

Session Chair: **Ke Du, Rochester Institute of Technology, Rochester, NY, United States**

**10:50am The Relationship between Young's Modulus and the Dry Etching Rate of Polydimethylsiloxane (PDMS)**  
**Technical Presentation.** IMECE2018-89760  
*Matthew Fitzgerald, Sara Tsai, Yang Zhao, Vanderbilt University, Nashville, TN, United States, Deyu Li, Vanderbilt Univ, Nashville, TN, United States*

**11:11am A Scalable Microfluidic Device for Switching of Microparticles Using Dielectrophoresis**

Technical Paper Publication. IMECE2018-87664

*Waqas Waheed, Khalifa University, Abu Dhabi, United Arab Emir., Anas Alazzam, Khalifa University of Science, Technology & Research (KUSTAR), Abu Dhabi, United Arab Emir., Bobby Mathew, UAE University, Al Ain, Abu Dhabi, United Arab Emir., Eiyad Abu-Nada, Ashraf Al-Khateeb, Khalifa University, Abu Dhabi, United Arab Emir.*

**11:32am Photosensitivity of Monolayer Graphene-Base Field Effect Transistor**

Technical Paper Publication. IMECE2018-87245

*JowesH Goundar, Tohoku University, Sendai, Japan, Ken Suzuki, Hideo Miura, Tohoku University, Sendai 980-8579, Miyagi, Japan*

**11:53am Atomically-precise graphene etch masks for 3D integrated systems from 2D material hetero-structures**

Technical Presentation. IMECE2018-87721

*Jangyup Son, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Junyoung Kwon, Yonsei university, Seoul, Korea (Republic), SunPhil Kim, Yinchun Lv, Jaehyung Yu, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Jong-Young Lee, Huije Ryu, Yonsei university, Seoul, Korea (Republic), Kenji Watanabe, Takashi Taniguchi, National Institute for Materials Science, Namiki, Japan, Rita Garrido-Menacho, Nadya Mason, Elif Ertekin, Pinshane Huang, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Gwan-Hyoung Lee, Yonsei university, Seoul, Korea (Republic), Arend van der Zande, University of Illinois at Urbana-Champaign, Urbana, IL, United States*

**13-7 APPLIED MECHANICS AND MATERIALS IN MICRO- AND NANO-SYSTEMS**

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**13-7-1 Applied Mechanics and Materials I**

**Room 338 2:05pm - 3:50pm**

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Session Chair: **Mitsuaki Kato**, *Toshiba Corporation, Kawasaki-Shi, OO, Japan*

Session Co-Chair: **Zahabul Islam**, *The Pennsylvania State University, State College, PA, United States*

**2:05pm Investigation of Moisture Damage Behavior of Warm-Mix Asphalt (WMA) With**

**Chemical WMA Additives Towards Repeated Load-Deformation Analysis**

**Draft Program**

**Technical Paper Publication.** IMECE2018-86273  
*Biswajit Bairgi, Rafiqul A. Tarefder, University of New Mexico, Albuquerque, NM, United States*

**2:26pm Strain Induced Grain Growth and Low Temperature Annealing of Palladium Thin Film**  
**Technical Presentation.** IMECE2018-86352  
*Zahabul Islam, The Pennsylvania State University, State College, PA, United States, Md Haque, Penn State University, University Park, PA, United States*

**2:47pm Evaluation Method for Performance of SiC Power Module by Electro-Thermal-Anisotropic Stress Coupled Analysis**  
**Technical Paper Publication.** IMECE2018-86626  
*Mitsuaki Kato, Toshiba Corporation, Kawasaki-Shi, OO, Japan, Akihiro Goryu, Toshiba Corporation, Kawasaki, Japan, Akira Kano, Kazuto Takao, Toshiba Corporation, Kawasaki-Shi, Japan, Kenji Hirohata, Toshiba Corporation, Kawasaki, Japan, Satoshi Izumi, The University of Tokyo, Bunkyo-ku, Japan*

**3:08pm Levy's Solution for Strain Gradient Plates under Transverse Loading: Nonlocal Boundary Value Problems**  
**Technical Presentation.** IMECE2018-89427  
*Bishweshwar Babu, B.P. Patel, Indian Institute of Technology Delhi, New Delhi, Delhi, India*

**3:29pm Natural Fibrous Catcher of Liquid**  
**Technical Presentation.** IMECE2018-89514  
*Moxiao Li, Tianjian Lu, Xi'an Jiaotong University, Xi'an, China, Feng Xu, Xi'an Jiaotong University, China, Shaanxi, China*

## **13-8 MICROFLUIDICS IN MICRO- AND NANOSYSTEMS**

### **13-8-1 Electric Field Driven Microfluidics**

**Fourth Floor, David L. Lawrence Convention Center, Room 405 2:05pm - 3:50pm**

Session Chair: **Nazmul Islam, Univ of Texas Rio Grande Valley, Edinburg, TX, United States**

**2:05pm Viscoelectric Effect on the Electroosmotic Flow in Nanochannels With Heterogeneous Zeta Potentials**  
**Technical Paper Publication.** IMECE2018-86384  
*Edson M. Jimenez, Universidad Nacional Autónoma de México, Facultad de Ingeniería, Departamento de Termofluidos, Ciudad de México, Mexico, Juan P. Escandon, Instituto Politecnico Nacional, SEPI-ESIME Unidad Azcapotzalco, Departamento de Termofluidos, Ciudad de México, Select State/Province, Mexico, Federico Méndez, Universidad Nacional Autónoma de México, Facultad de Ingeniería, Departamento de Termofluidos, Ciudad de México, Mexico*

**2:26pm Improving the Micropump Velocity for Orthogonal Electrode Pattern**  
**Technical Paper Publication.** IMECE2018-88629  
*Nazmul Islam, Univ of Texas Rio Grande Valley, Edinburg, TX, United States, Rakesh Guduru, Chu-Wen Cheng, UTRGV, Edinburg, TX, United States*

**2:47pm Knudsen Pump Powered Micro-Hovercrafts**  
**Technical Presentation.** IMECE2018-89552  
*John Cortes, Christopher Stanczak, Igor Bargatin, University of Pennsylvania, Philadelphia, PA, United States*

**3:08pm Analysis Of AC Electrokinetic Flow With Multiple Electrodes By Direct Measurement Of Velocity Fields**  
**Technical Presentation.** IMECE2018-89803  
*THARUN SRINIVAS KARNAM REDDY, Texas A&M University-kingsville, kingsville, TX, United States, Choongbae Park, Texas A&M University - Kingsville, Kingsville, TX, United States*

**3:29pm Magnetic Antibody Functionalized Carbon Nanotube Ink for Rapid Printing of Biosensors**  
**Technical Presentation.** IMECE2018-89666  
*Sarah Mishriki, Abdel Rahman Abdel Fattah, Ahmed M Abdalla, Elvira Meleca, Fei Geng, Suvojit Ghosh, McMaster University, Hamilton, ON, Canada, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

## **13-3 DESIGN AND FABRICATION, ANALYSIS, PROCESSES, AND TECHNOLOGY FOR MICRO AND NANO DEVICES AND SYSTEMS**

**13-3-3 Design and Fabrication, Analysis, Processes, and Technology for Micro and Nano Devices and Systems III**

**Room 338 4:00pm - 5:45pm**

Session Chair: **Namwon Kim, Texas State University, San Marcos, TX, United States**

**4:00pm Design and Analysis of Electrostatically Actuated Mechanical Sensor for Graphene**  
**Technical Paper Publication.** IMECE2018-86407  
*Ayse Tekes, Jungkyu Park, Kennesaw State University, Marietta, GA, United States*

**4:21pm Mechanical, Electrical and Electro-mechanical Properties of CNTs/Carbon Black/ SEBS-based TPE Nanocomposites for Large Deformation Sensor Applications**  
**Technical Presentation.** IMECE2018-86460  
*Xudong Yang, Lingyu Sun, Cheng Zhang, Bincheng Huang, Beihang university, Beijing, China*

**4:42pm 3D Numerical Model for Prediction of Percolation Threshold and Piezoresistive Characteristics of Conductive Polymer Filled With CNT**  
**Technical Paper Publication.** IMECE2018-86528  
*Jun Han, Lingyu Sun, Lijun Li, Beihang University, Beijing, China, Taikun Wang, Henan Key Laboratory of Underwater Intelligent Equipment, Zhengzhou Electromechanical Engineering Research Institute, Zhengzhou, China, Bincheng Huang, Xudong Yang, Beihang university, Beijing, China*

**5:03pm Area-Arrayed Graphene Nano-Ribbon-Based Strain Sensor**  
**Technical Paper Publication.** IMECE2018-87277  
*Ryohei Nakagawa, Zhi Wang, Tohoku University, Sendai, Miyagi-prefecture, Japan, Ken Suzuki, Tohoku University, Sendai 980-8579, Miyagi, Japan*

**5:24pm**      **Theoretical Study of Electronic Band Structure of Dumbbell-Shape Graphene Nanoribbons for Highly-Sensitive Strain Sensors**

Technical Paper Publication. IMECE2018-88431

*Qinqiang Zhang, Takuya Kudo, Tohoku University, Sendai, Japan, Ken Suzuki, Tohoku University, Sendai 980-8579, Miyagi, Japan*

## **13-7 APPLIED MECHANICS AND MATERIALS IN MICRO- AND NANO-SYSTEMS**

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### **13-7-2 Applied Mechanics and Materials II**

**Fourth Floor, David L. Lawrence Convention Center, Room 405      4:00pm - 5:45pm**

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Session Chair: **Wenbin Yu**, *Purdue University, West Lafayette, IN, United States*

Session Co-Chair: **Ryan Pocratsky**, *Carnegie Mellon University, Pittsburgh, PA, United States*

**4:00pm**      **Development of a Flexible Tactile Sensor Using Area-Arrayed Bundle Structures of Multi-Walled Carbon Nanotubes**

Technical Paper Publication. IMECE2018-87275

*Ryusaku Osada, Tohoku University, Sendai, Miyagi, Japan, Ken Suzuki, Tohoku University, Sendai 980-8579, Miyagi, Japan*

**4:21pm**      **Negative Poisson's Ratio in Two-dimensional Honeycomb Structures**

Technical Presentation. IMECE2018-89006

*Guangzhao Qin, University of South Carolina, Columbia, SC, United States, Zhenzhen Qin, Zhengzhou University, Zhengzhou, Henan, China*

**4:42pm**      **Multiscale analysis of multilayer printed circuit board using Mechanics of Structure Genome**

Technical Presentation. IMECE2018-89326

*Fei Tao, Wenbin Yu, Purdue University, WEST LAFAYETTE, IN, United States*

**5:03pm**      **A Test Chamber for Characterizing the Thermo-Mechanical Properties of Thin Films Under Harsh Conditions**

Technical Presentation. IMECE2018-89764

*Ryan Pocratsky, Longchang Ni, Prince Singh, Maarten De Boer, Carnegie Mellon University, Pittsburgh, PA, United States*

## **13-8 MICROFLUIDICS IN MICRO- AND NANOSYSTEMS**

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### **13-8-2 Microfluidics in Bioengineering Applications**

**Third Floor, David L. Lawrence Convention Center, Room 336      4:00pm - 5:45pm**

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Session Chair: **Mohammad Hossan**, *University of Central Oklahoma, Edmond, OK, United States*

**4:00pm**      **Capillary Force Driven Single-Cell Spiking Apparatus for Studying Circulating Tumor Cells**

Technical Paper Publication. IMECE2018-87109

*Jacob Amontree, Kangfu Chen, Jose Varillas, Z. Hugh Fan, University of Florida, Gainesville, FL, United States*

**4:21pm**      **The Development and Characterization of a ?Store and Create? Microfluidic Device to Study Ice Nucleation Particles**

Technical Presentation. IMECE2018-89479

*Thomas Brubaker, Carnegie Mellon University, Pittsburgh, PA, United States, Michael Polen, McDaniel College, Pittsburgh, PA, United States, Leif Jahn, Perry Cheng, Vinay Ekambaram, Shelley Anna, Ryan Sullivan, Carnegie Mellon University, Pittsburgh, PA, United States*

**4:42pm**      **Deformable Shallow Microfluidics: Physics of the Fluid Flow and Novel Particle Manipulation Platform for Filtration, Isolation, and Controlled Release**

Technical Presentation. IMECE2018-89655

*Aryan Mehboudi, Junghoon Yeom, Michigan State University, East Lansing, MI, United States*

**5:03pm**      **A Novel Microfluidic Device for High-throughput Immobilization and Mechanostimulation of Small Multicellular Organisms**

Technical Presentation. IMECE2018-89718

*Utku Sonmez, Ardon Z Shorr, John S. Minden, Carnegie Mellon University, Pittsburgh, PA, United States, Philip R. LeDuc, Carnegie Mellon Univ, Pittsburgh, PA, United States*

**5:24pm**      **The Effect of Electric Field on Cell Functions during DC Dielectrophoretic Cell Manipulation**

Technical Presentation. IMECE2018-86949

*Mohammad Hossan, Nicholas Walker, Melville Vaughan, Amalie L. Moyna, University of Central Oklahoma, Edmond, OK, United States*

## **ASME International Undergraduate Research and Design Expo (Posters Only)**

**SUNDAY, NOVEMBER, 11**

### **14-1 GENERAL**

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**14-1-1**

**Exhibit Hall      5:30pm - 7:30pm**

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**5:30pm**      **Effects of Forced Upstream Flow Fluctuations on Vortex Shedding Intensity in a Normal Triangular Tube Array**

Undergrad Expo. IMECE2018-88557

*Kazybek Kassym, Aida Iskaliyeva, Luis Rojas-Solorzano, Nazarbayev University, Astana, Astana, Kazakhstan*

**5:32pm**      **Design, Analysis and Realization of a Novel Compliant Bistable Mechanism**

Undergrad Expo. IMECE2018-88896

*Hongkuan Lin, Niko Giannakakos, Ayse Tekes, Kennesaw State University, Marietta, GA, United States*

**5:34pm** Take Home Lab Equipment Design to Study Free Response of Single DOF and 2 DOF Vibratory Mechanisms

Undergrad Expo. IMECE2018-88906

*Zach Marr, Michael Weitzel, Ayse Tekes, Julia Ortiz, Kennesaw State University, Marietta, GA, United States*

**5:36pm** Design and Analysis of a Novel Semi Compliant Swashplate Mechanism

Undergrad Expo. IMECE2018-88927

*Niko Giannakakos, Ayse Tekes, Adeel Khalid, Kennesaw State University, Marietta, GA, United States*

**5:38pm** Design, Analysis, Modeling and Experimental Validation of Compliant Five Bar Mechanism

Undergrad Expo. IMECE2018-89085

*Michael Weitzel, Ayse Tekes, Kennesaw State University, Marietta, GA, United States*

**5:40pm** Design and Experimental Validation of a Large Displacement Compliant Folded Beam Mechanism

Undergrad Expo. IMECE2018-89150

*Hunter Horner, Sergio Canchola, Cody Delarosa, Ayse Tekes, Kennesaw State University, Marietta, GA, United States*

**5:42pm** Engineering graphene-based membranes for electromechanical sensors

Undergrad Expo. IMECE2018-89195

*Owen D. Pearl, Adam N. Brock, Quang N. Tran, Gordon B. Walbert, Owen D. Papa, Dmitriy A. Dikin, Temple University, Philadelphia, PA, United States*

**5:44pm** Effect of Microfluidic Boundary Conditions on Flow Topology Optimization

Undergrad Expo. IMECE2018-89434

*Gabriel Garneau, Matthew Owen, Georg Pinggen, Union University, Jackson, TN, United States, Kurt Maute, University of Colorado Boulder, Boulder, CO, United States*

**5:46pm** Flow Over a Smooth Sphere, Sphere With Dimples and Sphere With Double Dimples

Undergrad Expo. IMECE2018-89440

*Andreina De La Cruz, LaGuardia Community College-CUNY, Long Island City, NY, United States, Kinnari Shah, LaGuardia Community College- CUNY, Long Island Cit, NY, United States*

**5:48pm** Design of a 3D Printed Modular Robot

Undergrad Expo. IMECE2018-89445

*Mark Bedillion, Carnegie Mellon University, Gibsonia, PA, United States, Xuan Chen, Jason Liu, Carnegie Mellon University, Pittsburgh, PA, United States*

**5:50pm** Developing Methods for Measuring Thermal Properties of Polyimide Substrates

Undergrad Expo. IMECE2018-89472

*Carlos Vargas Venegas, Penn State University, State College, PA, United States, Shawn Siroka, Penn State University, West Hazleton, PA, United States, Reid A. Berdanier, Penn State University, State College, PA, United States*

**5:52pm** Using Surface Wave Elastography to Investigate Achilles Tendon Stiffness

Undergrad Expo. IMECE2018-89536

*Alan Palmer, Kennesaw State University, Canton, GA, United States*

**5:54pm** Design and Fabrication of a UAV Protection System

Undergrad Expo. IMECE2018-89577

*Renato Rodriguez, Joseph Franke, Sijan Shrestha, Anthony Nguyen, Matthew Bishop, Dynamical Systems Lab / George Mason University, Fairfax, VA, United States, Robert Gallo, Damoon Soudbakhsh, George Mason University, Fairfax, VA, United States*

**5:56pm** High Temperature Digital Image Correlation for Propulsion Materials Testing

Undergrad Expo. IMECE2018-89593

*John Kershner, U.S. Army Research Laboratory, APG, MD, United States, Natasha Bradley, U.S. Army Research Laboratory, APG, MD, United States, Michael Walock, US Army Research Laboratory, Aberdeen Proving Ground, MD, United States, Anindya Ghoshal, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, United States, Muthuvel Murugan, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, United States*

**5:58pm** Three-dimensional Voxel-based Finite Element Analysis of Dental Implants

Undergrad Expo. IMECE2018-89620

*Kayla Reigh, Kangning Su, Penn State University, State College, PA, United States, Qiyuan Mao, Changzhou Institute of Light Industry, Changzhou, China, Mehran H. Zadeh, Temple University, Philadelphia, PA, United States, Greg Lewis, Penn State College of Medicine and M.S. Hershey Medical Center, Hershey, PA, United States, Jing Du, Penn State University, State College, PA, United States*

**6:00pm** Sponge Material Made of Reduced Graphene Oxide: Synthesis and Properties.

Undergrad Expo. IMECE2018-89637

*Gordon B. Walbert, Adam N. Brock, Owen Pearl, Owen D. Papa, Quang N. Tran, Dmitriy A. Dikin, Temple University, Philadelphia, PA, United States*

**6:02pm** Techno-Economic Analysis of MSW Bioenergy

Undergrad Expo. IMECE2018-89717

*Miranda Noack, St. Ambrose University, Davenport, IA, United States*

**6:04pm** Numerical Insights of Fluid-Thermal Characteristics in a Hybrid Microjet Liquid-Cooled Heat Sink

Undergrad Expo. IMECE2018-89720

*Shitiz Sehgal, Matthew Schultz, Bladimir Ramos, Penn State University, University Park, PA, United States*

**6:06pm** Laser-Induced Graphene Supercapacitors

Undergrad Expo. IMECE2018-89734

*Robert Sitbon, Queensborough Community College, Westwood, NJ, United States, Alex Sullivan, Queensborough Community College, Little Neck, NY, United States, Tricia Marchese, Queensborough Community College, Oakland Gardens, NY, United States*

**6:08pm Thermal Properties of a Concrete Aerogel Paste Composite**

**Undergrad Expo. IMECE2018-89775**

*Chris Kobus, Oakland Univ, Rochester, MI, United States*

**6:10pm Powering Small Satellites and Robots Using External Laser Beams**

**Undergrad Expo. IMECE2018-89843**

*Carter Hoffman, University of Arizona, Phoenix, AZ, United States, Jekan Thanga, University of Arizona, Tucson, AZ, United States*

**6:12pm Dynamics Of Mechanical Power Amplification Systems In Invertebrates**

**Undergrad Expo. IMECE2018-89849**

*Jennifer Beahan, SUNY New Paltz, New Paltz, NY, United States*

**6:14pm Highly Sensitive, Wireless Gas Sensing Based on 3D Nonporous Graphene and RFID**

**Undergrad Expo. IMECE2018-89860**

*Farbod Moghaddam, George Mason University, Fairfax, VA, United States, Daniel Mitchell, George Mason University, Chantilly, VA, United States, Pilgyu Kang, George Mason University, Fairfax, VA, United States, Byoung Gok Kim, Korea Research Insitue of Chemical Technology, Yuseong-gu, Daejeon, Korea (Republic), Minsu Kim, Korea Research Institute of Chemical Technology, Yuseong-gu, Daejeon, Korea (Republic)*

**6:16pm Mechanical Optimization of Composite Coatings Deposited by Self-Limiting Electro Spray Deposition**

**Undergrad Expo. IMECE2018-89899**

*Christianna Kuznetsova, Lin Lei, Dehyon Han, Jowon Lee, Jonathan Singer, Rutgers University, Piscataway, NJ, United States*

**6:18pm Energy Absorption Analysis of Additively Manufactured Lattice Mechanical Metamaterials**

**Undergrad Expo. IMECE2018-89930**

*John Recktenwald, George Mason University, Roanoke, VA, United States, Ali Beheshti, George Mason University, Fairfax, VA, United States*

**6:20pm Thermal Characterization of GaN-based Electronics and Optoelectronics**

**Undergrad Expo. IMECE2018-90001**

*Yiwen Song, Pennsylvania State University, University Park, PA, United States, Tae Kyoung Kim, Moon Uk Cho, Jae Min Lee, Joon Seop Kwak, Sunchon National University, Sunchon, Jeonnam, Korea (Republic), Sukwon Choi, Pennsylvania State University, University Park, PA, United States*

**6:22pm A Propulsion System for the Asteroid Mobile Imager and Geologic Observer (AMIGO)**

**Undergrad Expo. IMECE2018-90004**

*Gregory Wilburn, Univ. of Arizona, Tucson, AZ, United States, Jekan Thanga, University of Arizona, Tucson, AZ, United States*

**6:24pm Design and implementation of real time water monitoring system**

**Undergrad Expo. IMECE2018-90007**

*H.H. Sait, King Abdulaziz University, Rabigh, Makkah, Saudi Arabia, Khalid AlJudaybi, Abdullah Alkirithi, Mohammed Albarakati, Faiz Khadra, KAU, Rabigh, Makkah, Saudi Arabia*

**6:26pm Using Time Domain Indentation Data to Characterize the Poroelasticity of Gels in Frequency Domain**

**Undergrad Expo. IMECE2018-90008**

*Alvin Maningding, MOJTABA AZADI, San Francisco State University, San Francisco, CA, United States*

**6:28pm Leidenfrost phenomenon**

**Undergrad Expo. IMECE2018-90011**

*Nazanin Farokhnia, University of Houston, new york, NY, United States, Nazanin Farokhnia, NanoTherm research group, University of Houston, houston, TX, United States*

**6:30pm Uterus Material Properties Explored via Atomic Force Microscopy**

**Undergrad Expo. IMECE2018-90012**

*Jose Rivera, Alvin Maningding, Victor Emmanuel, San Francisco State University, San Francisco, CA, United States, Paolo Rinaudo, University of California at San Francisco, San Francisco, CA, United States, MOJTABA AZADI, SAN Francisco State University, San Francisco, CA, United States*

**6:32pm A comparative investigation of sintering methods for polymer 3D printing using Selective Separation Shaping (SSS)**

**Undergrad Expo. IMECE2018-90022**

*Hadis Nouri, University of Southern California (USC), Los angeles, CA, United States*

**6:34pm Thermal Properties and Microstructure Investigation of natural Particulate Blended High Density Polyethylene composite**

**Undergrad Expo. IMECE2018-90024**

*Binaji Ayyana Chinnappa, COIMBATORE INSTITUTE OF TECHNOLOGY, COIMBATORE, India*

**6:36pm The Effect Of Multi-Walled Carbon Nanotube Additives Into Diesel-Camphor Biofuel Blend On Diesel Engine Performance, Combustion And Emission**

**Undergrad Expo. IMECE2018-90030**

*Rahul Kumar Tiwari, Hyundai, Chennai, Tamil Nadu, India, Sanat Kumar, Texas A&M University, college station, TX, United States*

**6:38pm Self Powered Orthosis For Stroke Patient**

**Undergrad Expo. IMECE2018-90031**

*Rahul Kumar Tiwari, Hyundai, Chennai, Tamil Nadu, India, Sanat Kumar, Texas A&M University, college station, TX, United States*

**6:40pm Performance and Surface Integrity of Wire Electrical Discharge Machining of Thin Ti6Al4V Plate Using Coated and Uncoated Wires**

**Undergrad Expo. IMECE2018-90034**

*Luca Watanabe Reolon, pontificia universidade catolica do parana, Curitiba, Paran, Brazil, Carlos Augusto Laurindo, Ricardo Diego Torres, pontificia universidade catolica do parana, Curitiba, Brazil, Fred Lacerda Amorim, Apc-pucpr-Curitiba, Curitiba, PR, Brazil*

**6:42pm Pave the Path for New Architected Materials via Multi-Material 3D Printing**

**Undergrad Expo. IMECE2018-90035**

*Yaning Li, University of New Hampshire, Durham, NH, United States*

**6:44pm An Inflatable Aircraft for Mars Exploration**  
**Undergrad Expo. IMECE2018-90042**  
*Andrew Okonya, Univ. of Arizona, Tucson, AZ, United States, Aman Chandra, Jekan Thanga, University of Arizona, Tucson, AZ, United States*

**6:46pm Robotic Construction on the Moon and Mars using Selective Melting and Sintering**  
**Undergrad Expo. IMECE2018-90043**  
*Andrew Okonya, Erik Jensen, Univ. of Arizona, Tucson, AZ, United States, Aman Chandra, Jekan Thanga, University of Arizona, Tucson, AZ, United States*

**6:48pm Robotic Construction on the Moon and Mars using Selective Melting and Sintering**  
**Undergrad Expo. IMECE2018-90044**  
*Erik Jensen, Univ. of Arizona, Tucson, AZ, United States, Aman Chandra, Jekan Thanga, University of Arizona, Tucson, AZ, United States*

**6:50pm Fatigue Life Assessment of Dissimilar Aluminum Alloys weld Joints under Four Point Rotating Bending Condition**  
**Undergrad Expo. IMECE2018-90049**  
*Muhammad Hashir, Riffat Asim Pasha, University of Engineering and Technology Taxila, Taxila Rawalpindi, Punjab, Pakistan*

**6:52pm Microstructure-based Material Sensitive Design Framework**  
**Undergrad Expo. IMECE2018-90050**  
*Bryan Melara, California State University, Long Beach, Long Beach, CA, United States, Yan Li, California State University, Long Beach, Long Beach, CA, United States, Marco Rodriguez, Anh Phung, Jun Cao, California State University, Long Beach, Long Beach, CA, United States*

**6:54pm Investigation of thermocapillary-induced deposited shape in fused-coating additive manufacturing process of aluminum alloy**  
**Undergrad Expo. IMECE2018-90060**  
*Jun Du, Zhengying Wei, Xi'an Jiaotong University, Xi'an, China*

**6:56pm Optimization of process parameters and sectional shape of samples in Single-layer Single-pass Sn63Pb37 Fused Coating Additive Manufacturing**  
**Undergrad Expo. IMECE2018-90061**  
*Jun Du, Zhengying Wei, Xi'an Jiaotong University, Xi'an, China*

**6:58pm Preliminary System Development and Experimental Study of a Robotic Composite Prepreg Layup Process**  
**Undergrad Expo. IMECE2018-90071**  
*Vincent Legnetto, Andrew Wichelns, Yu Zhou, SUNY Polytechnic Institute, Utica, NY, United States*

**7:00pm Numerical simulation of visco-plastic fluid flow between two parallel plates with triangular obstacles**  
**Undergrad Expo. IMECE2018-90074**  
*Nariman Ashrafi, Iau, Tehran, Iran*

**7:02pm Computational Design of a Bird-Inspired Perching Landing Gear Mechanism**  
**Undergrad Expo. IMECE2018-90081**  
*Paul Nadan, Franklin W. Olin College of Engineering, Needham, MA, United States, Christopher Lee, Franklin W Olin College of Engg, Needham, MA, United States*

**7:04pm Defect Structure Induced Strength and Toughness Anisotropy in hexagonal Boron Nitride (hBN)**  
**Undergrad Expo. IMECE2018-90085**  
*Allison Procak, University of Delaware, Newark, DE, United States*

**7:06pm Material Testing of Skeletal Muscle under Simple Shear**  
**Undergrad Expo. IMECE2018-90086**  
*Joelle Andres-Beck, Bucknell University, Merlin, OR, United States*

**7:08pm Investigating a Framework for Visualizing Reinforcement Learning Algorithms via Quadrupedal Robotic Simulation**  
**Undergrad Expo. IMECE2018-90087**  
*Brendan Bogar, Paul Reverdy, University of Arizona, Tucson, AZ, United States*

**7:10pm Assessment of ultrasonic vibration assisted grinding of CSiC composites**  
**Undergrad Expo. IMECE2018-90077**  
*Yan Wang, Tianjin University of Science and Technology, Tianjin P.R., China, Jingnan Zhao, Yinghui Dong, Chang Shi, Tianjin University of Science and Technology, Tianjin, China*

**7:12pm Hole Shielding: An FEA Study in Optimizing Stress Reduction Around a Hole**  
**Undergrad Expo. IMECE2018-90078**  
*Russell Oehlert, Leidos, Oaks, PA, United States, Austin C Prete, University of Maryland, New Market, MD, United States, Daniel Longenecker, Honda R&D, Dublin, OH, United States, Stephen Kuchnicki, York College Of Pennsylvania, York, PA, United States*

**7:14pm An object-oriented framework for fast development and testing of mobile robot control algorithms**  
**Undergrad Expo. IMECE2018-90080**  
*David Chan, Paul Reverdy, University of Arizona, Tucson, AZ, United States, Minh Nguyen, Oshadha Gunasekara, Randall Kliman, University of Arizona Department of Aerospace and Mechanical Engineering, Tucson, AZ, United States*

**7:16pm Advanced Methods in Computational Mechanics Modelling using Learning Algorithms and Decision Support Systems**  
**Undergrad Expo. IMECE2018-90068**  
*Kingsley Abbulimen, University of Lagos, Lagos, OO, Nigeria*

**7:18pm A MODEL FOR GAS-LIQUID SLUG FLOW IN A HORIZONTAL DUCT**  
**Undergrad Expo. IMECE2018-90075**  
*Nariman Ashrafi, Iau, Tehran, Iran*

**Draft Program**

**7:20pm** Energy audit in mechanical department  
Undergrad Expo. IMECE2018-90076  
*K S Venkatesh*, Mar baselios college of engineering and technology, Trivandrum, Kerala, India, *Ashhad Noushad*, College, Kollam, Kerala, India, *Arjun Rakesh*, *Aswin S*, Mar baselios college of engineering and technology, Trivandrum, Select State/Province, India, *Gokul S Jain*, Mar baselios college of engineering and technology, Trivandrum Kerala, Kerala, India

**7:22pm** CFD simulation of structure of small scale prototype solar chimney power plant  
Undergrad Expo. IMECE2018-90079  
*Premendra Bansod*, G.H.Raisoni college of Engineering & Management wagholi Pune, PUNE, MAHARASHTRA, India

**NSF (Includes NSF Student Competition (Posters only))**

**WEDNESDAY, NOVEMBER, 14**

**15-1 NSF-FUNDED RESEARCH**

15-1-1

**11:30am - 2:30pm**

**11:30am** Transfer Printing of Integrated Electronics onto Cross-linked Collagen  
Poster Presentation. IMECE2018-88529  
*Salvador Moreno*, *Manuel Lopez Quesada*, University of Texas At Dallas, Richardson, TX, United States, *Majid Minary*, The University of Texas At Dallas, Richardson, TX, United States

**11:32am** Preparing for Academic Careers: Efficacy of Continuous Holistic Faculty Development  
Poster Presentation. IMECE2018-88895  
*Louis Everett*, Unif Of Texas El Paso, El Paso, TX, United States

**11:34am** Radiative Thermal Conduction by Plasmonic Resonator Chains in Semiconductor Nanowires  
Poster Presentation. IMECE2018-89066  
*Eric Tervo*, Georgia Tech, Atlanta, GA, United States, *Michael Gustafson*, *Baratunde Cola*, *Zhuomin Zhang*, *Michael Filler*, Georgia Institute of Technology, Atlanta, GA, United States

**11:36am** Two Part Natural Adhesive at Nano-Interfaces in Bone  
Poster Presentation. IMECE2018-89072  
*Seyedreza Morsali*, University of Texas At Dallas, Richardson, TX, United States, *Yang Wang*, The University of Texas at Dallas, Richardson, TX, United States, *Qian Qian*, University of Texas at Dallas, Richardson, TX, United States, *Majid Minary*, The University of Texas at Dallas, Richardson, TX, United States

**11:38am** Nature's Strategy to Enhance Mechanical and Fracture Properties of Nacre (Mother of Pearl)  
Poster Presentation. IMECE2018-89080  
*Sina Askarinejad*, University of Cambridge, Cambridge, United Kingdom, *Nima Rahbar*, Worcester Polytechnic Institute, Worcester, MA, United States

**11:40am** Role of Circumferential and Longitudinal Smooth Muscle in Murine Vaginal Tissue  
Poster Presentation. IMECE2018-89132  
*Gabrielle L. Clark*, *Dylan J. Lawrence*, *Sarah H. Lindsey*, Tulane University, New Orleans, LA, United States, *Laurephile Desrosiers*, *Leise R. Knoepp*, Ochsner Clinical School, New Orleans, LA, United States, *Carolyn L. Bayer*, *Kristin S. Miller*, Tulane University, New Orleans, LA, United States

**11:42am** Classification of Activities of Daily Living Based on Hand Kinematics Obtained Using an IR Depth Sensor  
Poster Presentation. IMECE2018-89169  
*Hajar Sharif*, University of Illinois at Urbana-Champaign, Urbana, IL, United States, *Pramod Chembrammel*, University of Illinois At Urbana Champaign, Urbana, IL, United States, *T. Kesavadas*, University of Illinois Urbana-Champaign, Mahomet, IL, United States

**11:44am** On The Multi-Field Processing Of Magnetoactive Elastomeric Composites  
Poster Presentation. IMECE2018-89182  
*Md Abdulla Al Masud*, *Zoubeida Ounaies*, *Paris vonLockette*, The Pennsylvania State University, State College, PA, United States

**11:46am** Interfacial and Transport Property Measurements of Liquid Sodium within a Porous Structure  
Poster Presentation. IMECE2018-89199  
*Alexander Limia*, *Peter Kottke*, *Daniel Silverstein*, *Andrei G. Fedorov*, Georgia Institute of Technology, Atlanta, GA, United States, *Shannon K. Yee*, Georgia Tech, Atlanta, GA, United States

**11:48am** Suction Effects in Crater Arrays  
Poster Presentation. IMECE2018-89205  
*LIU WANG*, *KyoungHo Ha*, *Shutao Qiao*, *Nanshu Lu*, UNIVERSITY OF TEXAS AT AUSTIN, AUSTIN, TX, United States

**11:50am** Adhesion and Friction Control the Aspect Ratio and Strain in 2D material Blisters  
Poster Presentation. IMECE2018-89210  
*Zhaohu Dai*, *Nanshu Lu*, University of Texas at Austin, Austin, TX, United States

**11:52am** Self-cleaning, high transmission, near unity haze OTS/silica nanostructured glass  
Poster Presentation. IMECE2018-89211  
*Sajad Haghanifar*, *Paul Leu*, University of Pittsburgh, Pittsburgh, PA, United States

**11:54am** Flexible nanoglass with highest combination of transparency and haze for optoelectronic plastic substrates  
Poster Presentation. IMECE2018-89243  
*Sajad Haghanifar*, *Paul Leu*, University of Pittsburgh, Pittsburgh, PA, United States

**11:56am** Exploring Biases Between Human and Machine Generated Designs  
Poster Presentation. IMECE2018-89244  
*Christian Lopez*, The Pennsylvania State University, Newport, PA, United States, *Conrad Tucker*, Penn State University, State College, PA, United States, *Scarlett Miller*, The Pennsylvania State University, University Park, PA, United States

**11:58am** Atomistic simulations of mechanical properties of circular and collapsed carbon nanotubes with covalent cross-links

Poster Presentation. IMECE2018-89260

*Arun Thapa, The University of Alabama, Tuscaloosa, AL, United States, Alexey Volkov, University of Alabama, Tuscaloosa, AL, United States*

**12:00pm** NUMERICAL INVESTIGATION OF INTERNAL FORCES DURING CARBON NANOTUBE FOREST SELF-ASSEMBLY

Poster Presentation. IMECE2018-89293

*Taher Hajilounezhad, Matthew Maschmann, University of Missouri-Columbia, Columbia, MO, United States*

**12:02pm** Electric Field Effects on KTN Ferroelectric Phase Transitions Studied by Ultrasound Pulse-Echo Technique

Poster Presentation. IMECE2018-89300

*Robert Mech, Gordon College Physics Department, Wenham, MA, United States*

**12:04pm** The Path to Optical Sorting of Large Dielectric Microparticles with Whispering Gallery Modes

Poster Presentation. IMECE2018-89301

*Alexander King, Nathan J. Jordan, Gordon College, Wenham, MA, United States*

**12:06pm** Maximizing Energy Efficiency and Minimizing Thermal Dose in Electrosurgical Tissue Joining Processes

Poster Presentation. IMECE2018-89311

*Scott Phillips, Washington State University, Pullman, WA, United States, Che-Hao Yang, Roland Chen, Washington State University, Pullman, WA, United States*

**12:08pm** Numerical Studies on Dynamic Interactions between Lugged Wheel and Granular Media

Poster Presentation. IMECE2018-89313

*Preethi Ravula, Gizem Dilber Acar, University of Maryland, College Park, College Park, MD, United States, Balakumar Balachandran, University of Maryland, College Park, Rockville, MD, United States*

**12:10pm** Effects of Target Thickness on Interfaces of Impact Welds

Poster Presentation. IMECE2018-89320

*Taeseon Lee, Anupam Vivek, Ohio State University, Columbus, OH, United States, Glenn Daehn, Ohio State Univ, Columbus, OH, United States*

**12:12pm** Scalable Pulsed Light Sintering of Nanomaterials

Poster Presentation. IMECE2018-89334

*Michael Dexter, Rutgers University, Middlesex, NJ, United States, Hyun-Jun Hwang, Rutgers, The State University of New Jersey, Piscataway, NJ, United States, Rajiv Malhotra, Rutgers University, Piscataway, NJ, United States, Chih-Hung Chang, Oregon State University, Corvallis, OR, United States*

**12:14pm** Tunable Granular Metamaterials Based Upon Wave Propagation Analysis Using Granular Micromechanics

Poster Presentation. IMECE2018-89335

*Nima NejadSadeghi, Anil Misra, University of Kansas, Lawrence, KS, United States*

**12:16pm** Additive Manufacturing Aids the Verification of Granular Micromechanics Model

Poster Presentation. IMECE2018-89339

*Nima NejadSadeghi, Anil Misra, University of Kansas, Lawrence, KS, United States*

**12:18pm** Effects of Environmental Conditions on Geometrical and Mechanical Properties of Polycarbonate Samples Made by the Fused Filament Fabrication Process

Poster Presentation. IMECE2018-89344

*YISHU YAN, Lichen Fang, Ojaswi Agarwal, JOHNS HOPKINS UNIVERSITY, Baltimore, MD, United States, Kevin Hemker, Johns Hopkins Univ, Baltimore, MD, United States, Sung Kang, Johns Hopkins University, Baltimore, MD, United States*

**12:20pm** TITANIUM OXYNITRIDE THIN FILMS WITH LARGE POWER CONVERSION EFFICIENCY IN PHOTOVOLTAIC SOLAR CELLS

Poster Presentation. IMECE2018-89348

*Nikhil Reddy Mucha, North Carolina A&T State University, Greensboro, NC, United States, Surabhi Shaji, Panupong Jai-pan, North Carolina A&T State Univ, Greensboro, NC, United States, Monica Kathiyar, Indian Institute of Technology, Kanpur, India, Jeffrey Shield, University of Nebraska Lincoln, Lincoln, NE, United States, Hemali Rathnayake, University of North Carolina at Greensboro, Greensboro, NC, United States, Dhananjay Kumar, NC A&T State Univ, Greensboro, NC, United States*

**12:22pm** Rate Dependent Fracture under Mixed-mode Loading Conditions for an Epoxy/Silicon Interface

Poster Presentation. IMECE2018-89365

*Tianhao Yang, University of Texas at Austin, Austin, TX, United States, Rui Huang, Univ Of Texas At Austin, Austin, TX, United States, Kenneth Liechti, Univ Of Texas, Austin, TX, United States*

**12:24pm** Validated Nonlinear Finite Element Analysis of Wire Rope Isolators under Dynamic Excitations

Poster Presentation. IMECE2018-89381

*Hamid Ghasemi, Claudia Marin, Howard University, Washington, DC, United States*

**12:26pm** Contactless Ultrafast Actuation by Using Photomechanical Instabilities in Azobenzene-functionalized Polymers

Poster Presentation. IMECE2018-89395

*Junfeng Gao, University of Pittsburgh, Pittsburgh, PA, United States, Matthew L. Smith, Hope College, Holland, MI, United States, M. Ravi Shankar, University of Pittsburgh, Pittsburgh, PA, United States*

**12:28pm Homogenization and Stochastic Fracture Simulation of Quasi-brittle Materials**

Poster Presentation. IMECE2018-89436

*Bahador Bahmani*, University of Tennessee, Knoxville, Tullahoma, TN, United States, *Reza Abedi*, University of Tennessee, Tullahoma, TN, United States, *Philip, L Clarke*, University of Tennessee Space Institute, Tullahoma, TN, United States, *Anand Nagarajan*, *Ming Yang*, The Ohio State University, Columbus, OH, United States, *Soheil Soghrati*, the Ohio State University, Dublin, OH, United States, *Katherine A. Acton*, University of St. Thomas, St. Paul, MN, United States

**12:30pm Understanding and Predicting Properties and Performance of Additively Manufactured Nickel-Based Superalloys**

Poster Presentation. IMECE2018-89437

*Weitao Shan*, *Grace V. de Leon Nope*, University of Pittsburgh, Pittsburgh, PA, United States

**12:32pm Adaptive space-time deep-learning enabled multiscale poromechanics**

Poster Presentation. IMECE2018-89460

*Kun Wang*, *Waiching Sun*, Columbia University, New York, NY, United States

**12:34pm Effects of Varying Processing Parameters on the Thermo-Physical Properties of 316L Stainless Steel Fabricated by Selective Laser Melting**

Poster Presentation. IMECE2018-89463

*Nigel Amofo-Yeboah*, Southern University and A&M College, Baton Rouge, LA, United States, *Patrick Mensah*, Southern University, Baton Rouge, LA, United States, *Stephen Akwabo*, Southern University and A&M College, Baton Rouge, LA, United States, *Samuel Ibekwe*, Southern University, Baton Rouge, LA, United States

**12:36pm Modeling of Multi ? Phase Heat Transfer in Micro ? Scale Heat Sinks**

Poster Presentation. IMECE2018-89466

*Kojo Asiamah Osafo*, Southern University A&M College, Baton Rouge, LA, United States, *Patrick Mensah*, Southern University, Baton Rouge, LA, United States, *Stephen Akwabo*, Southern University and A&M College, Baton Rouge, LA, United States

**12:38pm Experimental Investigation of Structural Power Flow in 2D Locally Resonant Elastic Metamaterials**

Poster Presentation. IMECE2018-89483

*Hasan Al Ba'ba'a*, *Mostafa Nouh*, University At Buffalo, Buffalo, NY, United States

**12:40pm 3D Printing of Molecularly Ordered Heterogeneous Active Matter**

Poster Presentation. IMECE2018-89486

*Mohsen Tabrizi*, University of Pittsburgh, Pittsburgh, PA, United States, *Mohand Saed*, *Taylor Ware*, The University of Texas at Dallas, Richardson, TX, United States, *M. Ravi Shankar*, University of Pittsburgh, Pittsburgh, PA, United States

**12:42pm Competitive Two-Stage Location and Pricing Decisions on a Network: An Air Transportation Case Study**

Poster Presentation. IMECE2018-89517

*Reed Harder*, *Vikrant Vaze*, Dartmouth College, Hanover, NH, United States

**12:44pm Design of Tribological Composites for Multi-functional Applications**

Poster Presentation. IMECE2018-89520

*Xiu Jia*, *Tomas Grejtak*, *Brandon A. Krick*, *Natasha Vermaak*, Lehigh University, Bethlehem, PA, United States

**12:46pm Pro-environmental social influence via randomized incentive programs**

Poster Presentation. IMECE2018-89540

*John Edgar Fontecha Garcia*, University at Buffalo, Buffalo, NY, United States, *Manjunath Jois*, U.S.Coast Guard, Elizabeth City, NC, United States, *Jose L Walteros*, *Alexander Nikolaev*, University at Buffalo, Buffalo, NY, United States

**12:48pm Microelasticity modeling of microstructures**

Poster Presentation. IMECE2018-89555

*Zachary J. Morgan*, *Yongmei M. Jin*, Michigan Technological University, Houghton, MI, United States

**12:50pm Scaling laws for porous solids with intermediate relative densities**

Poster Presentation. IMECE2018-89575

*Timothy Ibru*, Georgia Institute of Technology, Decatur, GA, United States, *Vadim Roytershteyn*, Space Science Institute, Boulder, CO, United States, *Garritt Tucker*, Colorado School of Mines, Golden, CO, United States, *Antonia Antoniou*, Georgia Institute of Technology, Atlanta, GA, United States

**12:52pm Parameter identification through analysis of electro-elastic nonlinearities in ultrasound acoustic energy transfer systems**

Poster Presentation. IMECE2018-89578

*Vamsi Chandra Mesala*, Virginia Tech, Blacksburg, VA, United States, *Muhammad Hajar*, Stevens Institute of Technology, Hoboken, NJ, United States, *Shima Shahab*, Virginia Tech, Blacksburg, VA, United States

**12:54pm X-Ray analysis of melt-spun nanostructured NiTiCu shape memory ribbons**

Poster Presentation. IMECE2018-89603

*Prashant Gunai*, *PRANAV BHALE*, *Pnina Ari-Gur*, Western Michigan University, Kalamazoo, MI, United States

**12:56pm Second-order homogenization estimates for the macroscopic behavior and field fluctuations in viscoplastic composites and comparisons with full-field simulations**

Poster Presentation. IMECE2018-89609

*Joshua Furer*, *Pedro Ponte Castañeda*, University of Pennsylvania, Philadelphia, PA, United States

**12:58pm Origin of Nanoscale Friction Contrast Between Graphene and MoS2**

Poster Presentation. IMECE2018-89612

*Han Ye*, University of Pennsylvania, Philadelphia, PA, United States, *Zhijiang Ye*, Miami University, Oxford, OH, United States, *Mohammad R. Vazirisereshk*, University of California, Merced, Merced, CA, United States, *Mengqiang Zhao*, *A. T. Charlie Johnson*, University of Pennsylvania, Philadelphia, PA, United States, *Ashlie Martini*, University of California -Merced, Atwater, CA, United States, *Robert W. Carpick*, University of Pennsylvania, Philadelphia, PA, United States

Draft Program

**1:00pm** A comprehensive study of soft porous lubrication, from red cells to skiing/snowboarding  
Poster Presentation. IMECE2018-89621  
*Zenghao Zhu, Villanova University, Villanova, PA, United States, Qianhong Wu, Villanova Univ, Villanova, PA, United States*

**1:02pm** Optimizing the Input Parameters of Binder Jetting for the Additive Manufacturing (AM) of Aluminum Oxide  
Poster Presentation. IMECE2018-89628  
*Edgar Mendoza, CARNEGIE MELLON UNIVERSITY, Pittsburgh, PA, United States*

**1:04pm** The Taylor-Culick Profile for Spinning Rocket Motors  
Poster Presentation. IMECE2018-89629  
*Orie Cecil, Joseph Majdalani, Auburn University, Auburn University, AL, United States*

**1:06pm** Effects of Surface Energy Reducing Agents on Adhesion Force in Liquid Bridge Microstereolithography  
Poster Presentation. IMECE2018-89638  
*Aslan Bafahm Alamdari, Jeongwoo Lee, Md Omar Faruk Emon, University of Akron, Akron, OH, United States, Jae-Won Choi, The University of Akron, Akron, OH, United States*

**1:08pm** Chance-Constrained Optimal Control Approach to Optimal Path Planning  
Poster Presentation. IMECE2018-89648  
*Rachit Aggarwal, Mrinal Kumar, The Ohio State University, Columbus, OH, United States*

**1:10pm** Hydrodynamic Performance of Optimal Flexible Hydrofoil Kinematics for Biomimetic Design  
Poster Presentation. IMECE2018-89656  
*Hisham Shehata, Craig Woolsey, Muhammad Hajj, Virginia Tech, Blacksburg, VA, United States*

**1:12pm** In-Situ Monitored Self-Assembly of 3D Graphene-based Nanostructures  
Poster Presentation. IMECE2018-89662  
*Chunhui Dai, Kriti Agarwal, Jeong-Hyun Cho, University of Minnesota, Minneapolis, MN, United States*

**1:14pm** Design of 2D/3D-Helmholtz Coil Systems for Driving FePd nanohelix Nanorobots for Cancer Treatment and of Dynamic Mechanical Tester System for Layered Structure of Agarose Gel and Cancer Cells  
Poster Presentation. IMECE2018-89684  
*Minoru Taya, Cerwyn Chiew, Satomi Takao, University of Washington, Seattle, WA, United States*

**1:16pm** A Comprehensive Study of Fluid Flow in a Soft Porous Material under Compaction  
Poster Presentation. IMECE2018-89700  
*Qiuyun Wang, Villanova University, Chesterbrook, PA, United States, Qianhong Wu, Villanova Univ, Villanova, PA, United States*

**1:18pm** New Design of a Mechanical Transducer in Atomic Force Microscopy for Imaging beyond Topography  
Poster Presentation. IMECE2018-89724  
*Sajith Dharmasena, The Ohio State University, Columbus, OH, United States, Randi Potekin, Purdue University, Purdue, IN, United States, Zining Yang, Seok Kim, University of Illinois at Urbana-Champaign, Urbana, IL, United States, Lawrence Bergman, Univ Of Illinois/Urbana, Urbana, IL, United States, Alexander Vakakis, University of Illinois, Urbana, IL, United States, Hanna Cho, The Ohio State University, Columbus, OH, United States*

**1:20pm** Novel Supply Chain and Process Modeling for Cell Therapy Manufacturing and Distribution  
Poster Presentation. IMECE2018-89756

*Yi Liu, Robert Bishop, Aubrey Incorvaia, Georgia Institute of Technology, Atlanta, GA, United States, Amritava Das, University of Wisconsin-Madison, Madison, WI, United States, Bhavya Divvela, Georgia Institute of Technology, Atlanta, GA, United States, Krishanu Saha, University of Wisconsin-Madison, Madison, WI, United States, Aaron Levine, Kan Wang, Chelsea White, Ben Wang, Georgia Institute of Technology, Atlanta, GA, United States*

**1:22pm** High Prandtl number facility for study of Rayleigh-Benard convection in various container shapes.  
Poster Presentation. IMECE2018-89757

*Jessica Imgrund, Hamed Ziad Ammar, Stephen R. Johnston, Georgia Institute of Technology, Atlanta, GA, United States, Enrico Fonda, New York University, Brooklyn, NY, United States, Devesh Ranjan, Georgia Institute of Technology, Atlanta, GA, United States, Katepalli R. Sreenivasan, New York University, Brooklyn, NY, United States*

**1:24pm** Fully Logic Utilization for UAV Path Planning  
Poster Presentation. IMECE2018-89777  
*Zoe Lee, Manish Kumar, Kelly Cohen, University of Cincinnati, Cincinnati, OH, United States*

**1:26pm** Theoretical and Experimental Study of Transient Squeezing Flow  
Poster Presentation. IMECE2018-89813  
*Ji Lang, Villanova University, Villanova, PA, United States, Qianhong Wu, Villanova Univ, Villanova, PA, United States*

**1:28pm** Atomistic Simulation and Classical Nucleation Theory of Edge Dislocation Jog-Pair Formation in Aluminum  
Poster Presentation. IMECE2018-89816  
*Anas Abu-Odeh, Maeva Cottura, Mark Asta, UC Berkeley, Berkeley, CA, United States*

**1:30pm** Adhesion Study for Robotic 3D Printing  
Poster Presentation. IMECE2018-89836  
*Arriana Nwodu, Florida Agricultural & Mechanical University, Tallahassee, FL, United States, Raquel Werner, Jolie Frketic, Florida State University, Tallahassee, FL, United States, Tarik Dickens, Florida Agricultural & Mechanical University, Tallahassee, FL, United States*

Draft Program

**1:32pm**            **Magnetocaloric properties of Fe<sub>90</sub>Ta<sub>10</sub> Thin films**

**Poster Presentation.** IMECE2018-89850

**Surabhi Shaji**, North Carolina A&T State Univ, Greensboro, NC, United States, **Prakash Giri**, University of Nebraska Lincoln, Lincoln, NE, United States, **Nikhil Reddy Mucha**, North Carolina A&T State University, Greensboro, NC, United States, **Christian Binek**, University of Nebraska Lincoln, Lincoln, NE, United States, **Dhananjay Kumar**, NC a&t State Univ, Greensboro, NC, United States

**1:34pm**            **Experimental Assessment of Miniature Accelerometers Designed for Sensing Middle Ear Motion**

**Poster Presentation.** IMECE2018-89857

**Alison Hake**, **Chuming Zhao**, University of Michigan, Ann Arbor, MI, United States, **Wang-Kyung Sung**, Vesper Technologies Inc., Boston, MA, United States, **Karl Grosh**, Univ Of Michigan, Ann Arbor, MI, United States

**1:36pm**            **Influence Of Gold Catalyst On the Growth Of Titanium Nitride Nanowires**

**Poster Presentation.** IMECE2018-89858

**Panupong Jaipan**, North Carolina A&T State Univ, GREENSBORO, NC, United States, **Chandra Nannuri**, **Nikhil Reddy Mucha**, **Kaushik Sarkar**, North Carolina A&T State University, Greensboro, NC, United States, **Adele Moatti**, **Jay Narayan**, North Carolina State University, Raleigh, NC, United States, **Svitlana Fialkova**, NC A&T SU, Greensboro, NC, United States, **Dhananjay Kumar**, NC a&t State Univ, Greensboro, NC, United States

**1:38pm**            **Design and Validation of New Cryogenic Nitrogen Facility for Exploration of Rayleigh-Benard Convection at High Rayleigh Numbers**

**Poster Presentation.** IMECE2018-89851

**Stephen R. Johnston**, **Jessica Imgrund**, Georgia Institute of Technology, Atlanta, GA, United States, **Enrico Fonda**, **Katepalli R. Sreenivasan**, New York University, Brooklyn, NY, United States, **Devesh Ranjan**, Georgia Institute of Technology, Atlanta, GA, United States

**1:40pm**            **Dependence of Mechanical Characteristics of Polymer-grafted Particle Films on Chain Architecture**

**Poster Presentation.** IMECE2018-89868

**Jaejun Lee**, **Zongyu Wang**, **Tingwei Deng**, **Robert F. Davis**, Carnegie Mellon University, PITTSBURGH, PA, United States, **Krzysztof Matyjaszewski**, **Micheal R Bockstaller**, Carnegie-Mellon University, Pittsburgh, PA, United States

**1:42pm**            **A Combined Experimental and Computational Study on the Process-structure-property Relationship of Additively Manufactured Bi-continuous Piezocomposites**

**Poster Presentation.** IMECE2018-89872

**Zhuo Wang**, Mississippi state university, Starkville, MS, United States, **Li He**, The University of Iowa, Iowa City, IA, United States, **Wenhua Yang**, Mississippi State University, Starkville, MS, United States, **Xuan Song**, The University of Iowa, Iowa City, IA, United States, **Lei Chen**, Mississippi State University, Starkville, MS, United States

**1:44pm**            **Additive Manufacturing of Complex Micro-architected Graphene Aerogels**

**Poster Presentation.** IMECE2018-89882

**Ryan Hensleigh**, **Huachen Cui**, Virginia Tech, Blacksburg, VA, United States, **James Oakdale**, **Jianchao Ye**, **Patrick Campbell**, **Eric Duoss**, **Christopher M. Spadaccini**, Lawrence Livermore National Laboratory, Livermore, CA, United States, **Xiaoyu Zheng**, Virginia Tech, Blacksburg, VA, United States, **Marcus Worsley**, Lawrence Livermore National Laboratory, Livermore, CA, United States

**1:46pm**            **Phase Transforming Architected/Cellular Materials under biaxial/multiaxial loading conditions**

**Poster Presentation.** IMECE2018-89887

**Yunlan Zhang**, **Mirian Velay**, **Pablo Zavattieri**, Purdue University, West Lafayette, IN, United States, **David Restrepo**, san antonio university, San Antonio, TX, United States, **Nilesh Mankame**, General Motors Res & Dev, Warren, MI, United States

**1:48pm**            **A Comparative Study on Selective Laser Melting and Electron Beam Additive Manufacturing Processes**

**Poster Presentation.** IMECE2018-89915

**M Shafiqur Rahman**, **Paul D. Herrington**, University of New Orleans, New Orleans, LA, United States, **Paul Schilling**, Univ Of New Orleans, New Orleans, LA, United States, **Uttam Chakravarty**, University of New Orleans, Kenner, LA, United States

**1:50pm**            **A Microstructure-Based Modeling Approach for Electrostriction in Relaxor**

**Poster Presentation.** IMECE2018-89919

**Anil Erol**, The Pennsylvania State University, University Park, PA, United States, **Paris Von Lockette**, Penn State University, University Park, PA, United States

**1:52pm**            **Mapping of phonon modes between two-dimensional and three-dimensional systems**

**Poster Presentation.** IMECE2018-89920

**Hyun-Young Kim**, Carnegie Mellon University, Pittsburgh, PA, United States, **Alan McGaughey**, Carnegie Mellon Univ, Pittsburgh, PA, United States

**1:54pm**            **Assessment of Angiogenesis and Cell Survival of a Multi-layered Bio-printed Aortic Construct**

**Poster Presentation.** IMECE2018-89932

**Beu P Oropeza**, **Luis H Solis**, **Daisy Alvarado**, University of Texas El Paso, El Paso, TX, United States, **Jesus Castor**, **Mirsa Gonzalez Favela**, **Alba Leyva**, **Emilio Loera**, **Gisela Lopaz**, **Fernanda Lugo**, **Erik Munoz**, **Paola Rodriguez**, **Leila Subia**, **Valeria Altamirano**, **Jesus Cedeno**, **Dante Chaparro Vega**, **Octavio Cordova**, **Isaac Deaguero**, **Erwin Delgado**, **Michael Furth**, **Mario Garcia**, **Tania Miramontes**, **Carlos Serna**, **Arahim Zuniga Herrera**, **Thomas Boland**, University Texas El Paso, El Paso, TX, United States

**1:56pm**            **Removal of Off-Flavor Compounds in Aquaculture Environment: Optimizing New Techniques for Sustainable Aquaculture Systems**

**Poster Presentation.** IMECE2018-89944

**Tunan Peng**, **Norma Alcantar**, University of South Florida, Tampa, FL, United States

**1:58pm**                    **Continuous Phase Transition Control of Vanadium Dioxide Using Feedback Mechanism**  
Poster Presentation. IMECE2018-89955  
*Jiguo Dai, Chandika Annasiwatta, Jordan Berg, Ayrton Bernussi, Zhaoyang Fan, Beibei Ren, Texas Tech University, Lubbock, TX, United States*

**2:00pm**                    **Design and Additive Manufacturing of Self-Sensing Architected Metamaterials**  
Poster Presentation. IMECE2018-89986  
*Amanda Wei, Xiaoyu Zheng, Virginia Tech, Blacksburg, VA, United States*

**2:02pm**                    **Welding Robotic Co-worker: autonomous welding seam extraction**  
Poster Presentation. IMECE2018-90020  
*Yao Li, University of Illinois At Urbana-Champaign, Urbana, IL, United States, T. Kesavadas, University of Illinois Urbana-Champaign, Mahomet, IL, United States*

**15-2 NSF RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU)**

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**15-2-1**

**11:30am - 2:30pm**

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**11:30am**                    **Custom Instrumentation for Vibration Assisted Nano Abrasive Machining Process**  
Poster Presentation. IMECE2018-89111  
*Nathan Darkins, University of Cincinnati, Cincinnati, OH, United States, Anne Brant, University of Cincinnati, Blue Ash, OH, United States, Murali Sundaram, University of Cincinnati, Cincinnati, OH, United States*

**11:45am**                    **Printing of three dimensional metal structures by electrochemical additive manufacturing**  
Poster Presentation. IMECE2018-89112  
*Narek Manukyan, University of Cincinnati, Cincinnati, OH, United States, Anne Brant, University of Cincinnati, Blue Ash, OH, United States, Murali Sundaram, University of Cincinnati, Cincinnati, OH, United States*

**12:00pm**                    **Dispersion Mechanics of Inertially Amplified Acoustic Metamaterials**  
Poster Presentation. IMECE2018-89484  
*David DePauw, Mostafa Nouh, University at Buffalo, Buffalo, NY, United States*

**12:15pm**                    **Water Desalination Using UV-Polymerizable Lyotropic Liquid Crystal-Carbon Nanotube Composite Membranes**  
Poster Presentation. IMECE2018-89492  
*Dominique Porcincula, California Polytechnic State University, San Luis Obispo, CA, United States, Chris Kasprzak, Virginia Tech, Blacksburg, VA, United States, Alejandro Madriz, California Polytechnic State University, San Luis Obispo, CA, United States, Shanju Zhang, Cal Poly, San Luis Obispo, CA, United States*

**12:30pm**                    **Failure Resilient Design of an Electro-Hydrostatic Actuator based Flight Control System**  
Poster Presentation. IMECE2018-89635  
*Samuel Zelman, Pingfeng Wang, University of Illinois at Urbana-Champaign, Urbana, IL, United States*

**12:45pm**                    **Nanoporous Copper In Dentin Resin Composites**  
Poster Presentation. IMECE2018-89642  
*Sarah Violante, Georgia Institute of Technology, Atlanta, GA, United States, Timothy Ibru, Georgia Institute of Technology, Decatur, GA, United States, Antonia Antoniou, Georgia Institute of Technology, Atlanta, GA, United States*

**1:00pm**                    **Research Experience for Teachers - Similarities with REU Experience**  
Poster Presentation. IMECE2018-89776  
*Chris Kobus, Xia Wang, Oakland Univ, Rochester, MI, United States*

**1:15pm**                    **Mechanical behavior of Poly(lactic acid) undergoing degradation**  
Poster Presentation. IMECE2018-89792  
*Anton Venediktov, New Jersey Institute of Technology, Newark, NJ, United States, Shawn Chester, New Jersey Institute of Technology, North Caldwell, NJ, United States*

**1:30pm**                    **Optimizing Microrobotic Flight With Two-Photon Polymerization**  
Poster Presentation. IMECE2018-89802  
*Lisa Soderlind, Igor Paprotny, University of Illinois at Chicago, Chicago, IL, United States*

**1:45pm**                    **Fabrication and Characterization of Colored Nanoporous Sol-Gel Glasses**  
Poster Presentation. IMECE2018-89878  
*Chih-Hung Chang, Alvin Chang, Oregon State University, Corvallis, OR, United States, Yajuan He, OSU, Corvallis, OR, United States, Maria TorresArango, WVU, Morgantown, WV, United States, Rajiv Malhotra, Rutgers University, New Brunswick, NJ, United States, Kostas Sierros, WVU, Morgantown, WV, United States, Zhenxing Feng, Maoyu Wang, OSU, Corvallis, OR, United States, Yang Ren, APS, Argonne, IL, United States*

**2:00pm**                    **Papertronic Leak Detectors**  
Poster Presentation. IMECE2018-89961  
*Mauroof Khan, Ramendra Pal, Xiyue Zou, Rutgers University, Piscataway, NJ, United States, Urvish Patel, Rutgers University, Carteret, NJ, United States, Aaron Mazzeo, Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

**2:15pm**                    **Flexible and Conformal Paper-based, Force-Sensing Pads**  
Poster Presentation. IMECE2018-89978  
*Cora LoPresti, Tongfen Liang, Xiyue Zou, Rutgers University, Piscataway, NJ, United States, Aaron Mazzeo, Rutgers, The State University of New Jersey, Piscataway, NJ, United States*

**Draft Program**

**Virtual Podium (Posters)**  
**WEDNESDAY, NOVEMBER, 14**

**16-1 ACOUSTICS, VIBRATION, AND PHONONICS**

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**16-1-1 Acoustics, Vibration, and Phononics**

**11:30am - 2:30pm**

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**11:30am**                    **On the Role of Geometry Parameters in the Dynamic Characteristic and Stability of Wave Journal Bearings**

Poster Paper Publication. IMECE2018-88258  
*Baisong Yang, Xi'an Jiaotong University, Shaanxi, China, Sheng Feng, Xian Jiaotong University, Zian City, China, Haipeng Geng, Jian Zhou, Lie Yu, Xi'an Jiaotong University, Xi'an City, China*

**12:15pm**                    **Origami-based Elastic Metamaterials for Low Frequency Vibration Suspension and Flexural Wave Control**

Poster Presentation. IMECE2018-88516  
*Mingkai Zhang, Beijing Institute of Technology, Beijing, Beijing, China, Rui Zhu, University of Washington, Seattle, WA, United States*

**1:00pm**                    **Vorticoacoustic Stability Analysis of the Bidirectional Vortex Engine**

Poster Presentation. IMECE2018-89037  
*Paul Kovacic, Auburn University, Auburn, AL, United States*

**1:45pm**                    **Analyzing The Interaction of Neural Signals In The Auditory Brain Structures With Applied Signal Processing Technologies**

Poster Presentation. IMECE2018-89283  
*Na Zhu, University of Michigan - Flint, Flint, MI, United States, Casey Chisnell, University of Michigan?Flint, Flint, MI, United States, Hao Luo, Jinsheng Zhang, Wayne State University, Detroit, MI, United States*

**16-2 ADVANCED MANUFACTURING**

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**16-2-1 Advanced Manufacturing**

**11:30am - 2:30pm**

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**11:30am**                    **Solution-Gated Ion-Sensitive Field Effect Transistor With Polymer Selective Membrane for Nitrate Detection**

Poster Paper Publication. IMECE2018-87918  
*Jungyoon Kim, Qingyuan Liu, Tianhong Cui, University of Minnesota, Minneapolis, MN, United States*

**11:50am**                    **Development of a Low Coefficient of Thermal Expansion Composite Tooling via 3D Printing**

Poster Paper Publication. IMECE2018-88594  
*Pedro Cortes, Michael Maravola, Michael Juhasz, Douglas Rutana, Bridger Kowalczyk, Brett Conner, Eric Macdonald, Youngstown State University, Youngstown, OH, United States*

**12:10pm**                    **Dynamic Testing of Polymeric AM Parts with Different Infill Conditions**

Poster Presentation. IMECE2018-88702  
*Serdar Tumkor, Jonathan Holman, Jace, M. Rearick, Mitchell, D. Krinock, Joe Doerfler, University of Pittsburgh, Johnstown, PA, United States*

**12:30pm**                    **DESIGN INNOVATION IN A WATER WELL POTABLE DRILLING MACHINE**

Poster Presentation. IMECE2018-88776  
*Rufus Chime, Institute of Management and Technology, Enugu State 400001, Nigeria*

**12:50pm**                    **DESIGN INNOVATION IN PALM KERNEL CRACKING MACHINE:DESIGN FOR MANUFACTURING**

Poster Presentation. IMECE2018-88777  
*Rufus Chime, Institute of Management and Technology, Enugu State 400001, Nigeria*

**1:10pm**                    **Machining and Bio-Machining Considerations**

Poster Presentation. IMECE2018-88989  
*Satya Prasad Paruchuru, VNRVJIET, Hyderabad, India*

**1:30pm**                    **Considerations for Bulk-Manufacturing Simulators**

Poster Presentation. IMECE2018-88996  
*Satya Prasad Paruchuru, VNRVJIET, Hyderabad, India*

**1:50pm**                    **Microscale 3D Printing by Additive Nanoparticle Assembly for Energy Storage Systems and Biomedical Devices**

Poster Presentation. IMECE2018-89039  
*Sade Saleh, Idris Nicholas R. Bezbaruah, Eric Yttri, Rahul Panat, Carnegie Mellon University, PITTSBURGH, PA, United States*

**2:10pm**                    **Integrative Additive Manufacturing for Hermetically Sealed Functional Components**

Poster Presentation. IMECE2018-89992  
*Marquese Pollard, Florida Agricultural and Mechanical University, Tallahassee, FL, United States*

**16-4 BIOMEDICAL & BIOTECHNOLOGY ENGINEERING**

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**16-4-1 Biomedical & Biotechnology Engineering**

**11:30am - 2:30pm**

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**11:30am**                    **Estimation Method of 3D Position of Guidewire in Endovascular Treatment**

Poster Paper Publication. IMECE2018-86392  
*Hirohito YAMAMOTO, Yamaguchi university, Yamaguchi, Japan, Koji MORI, Takashi Saito, Hiroko Kadowaki, Yamaguchi university, Ube / Yamaguchi, Japan*

**11:35am**                    **The Effect of Shoe Sole Stiffness on Trunk Lean**  
**Poster Presentation.** IMECE2018-86496  
*Garrett Sutton, Matthew Yough, Travis Schmeling, Casey Vollmer, Abdulhamid Khawajah, Anne Schmitz, Gannon University, Erie, PA, United States*

**11:40am**                    **A Numerical Bioheat Transfer Model to Estimate Time of Death with Application in Forensic Science**  
**Poster Presentation.** IMECE2018-86614  
*Saeed Tiari, Madeline Carnell, Rebecca Red Horse, Olivia Rose, Gannon University, Erie, PA, United States*

**11:45am**                    **Computational Study of Onset Dynamics in Neuron-Spiking With Threshold Adaptation**  
**Poster Paper Publication.** IMECE2018-86689  
*Loabat Shojaei Kavan, Abhijeet Wadkar, University of Western Ontario, London, ON, Canada, Samuel Asokanthan, Univ Of Western Ontario, London, ON, Canada*

**11:50am**                    **Reproduction Analysis of Injury Condition Using Finite Element Modeling of the Head in Cases With Traumatic Higher Brain Dysfunction Caused by Traffic Accidents**  
**Poster Paper Publication.** IMECE2018-86945  
*Shigeto Hayashi, Hyogo Emergency Medical Center, Japanese Red Cross Kobe Hospital, KOBE, Japan, Hiromichi Nakadate, SHINSHU UNIVERSITY, Ueda, Japan, Yuelin Zhang, Sophia University, Tokyo, Japan, Kojiro Mekata, Haruo Yamashita, Japanese Red Cross Kobe Hospital, KOBE, Japan, Shinichi Nakayama, Hyogo Emergency Medical Center, KOBE, Japan, Eiji Kohmura, Kobe University Graduate School of Medicine, KOBE, Japan, Yasuhiro Matsui, National Traffic Safety and Environment Laboratory, Chofu, Japan, Hong Ji, Beijing Computing Center, Beijing, China, Shigeru Aomura, TOKYO METROPOLITAN UNIVERSITY, Hino, Japan*

**11:55am**                    **Development of a Low-Cost Hip Flexion Assistive Device**  
**Poster Presentation.** IMECE2018-87101  
*Grace McGrath, Madeline Carnell, Stacy Joseph, Anne Schmitz, Gannon University, Erie, PA, United States*

**12:00pm**                    **Effects of Prosthetic Simulator on Muscle Activity**  
**Poster Presentation.** IMECE2018-87161  
*Olivia Rose, Benjamin Reed, Rebecca Red Horse, Aaron Mandrake, Mohammed Ashmouni, Gannon University, Erie, PA, United States*

**12:05pm**                    **Monte Carlo Simulation for High-k MOSFET Dosimeters**  
**Poster Presentation.** IMECE2018-87170  
*Hui Niu, Ansys Inc, Canonsburg, PA, United States*

**12:10pm**                    **Simulation of the strain amplification in sulci due to blunt impact to the head**  
**Poster Presentation.** IMECE2018-88176  
*Brian Fagan, ARL WMRD, Adelphi, MD, United States, Timothy Zhang, Sikhanda S Satapathy, ARL WMRD, APG, MD, United States*

**12:15pm**                    **Developing Activated Carbon From Date Seeds and Carbon Fiber for Use in Liver Support Devices**  
**Poster Paper Publication.** IMECE2018-88233  
*Ali Hilal-Alnaqbi, UAEU, Alain, United Arab Emir., Asef Mwafy, Ameerah Seyedzadeh, Waleed Ahmed, United Arab Emirates University, Al Ain, United Arab Emir., Aisha Hilal Alnaqbi, UAE University, Al Ain, Al Ain, United Arab Emir.*

**12:20pm**                    **Development of a novel 3D printing for porous bioceramic scaffolds**  
**Poster Presentation.** IMECE2018-88256  
*Maohua Lin, Yunqing Kang, Florida Atlantic university, Boca Raton, FL, United States, Chi-tay Tsai, Florida Atlantic Univ, Boca Raton, FL, United States, Xuesong Wang, florida atlantic university, BOCA RATON, FL, United States*

**12:25pm**                    **In silico analysis of the failure of uniaxial testing specimens**  
**Poster Presentation.** IMECE2018-88381  
*Ronald Fortunato, University of Pittsburgh, Venetia, PA, United States, Chao Sang, Spandan Maiti, Anne M Robertson, University of Pittsburgh, Pittsburgh, PA, United States*

**12:30pm**                    **Breaking Bones**  
**Poster Presentation.** IMECE2018-88735  
*Rebekah Eberle, Bashayr Alturkestani, Anne Schmitz, Gannon University, Erie, PA, United States*

**12:35pm**                    **Development of a Lizard PBT Data Collection Apparatus**  
**Poster Presentation.** IMECE2018-88809  
*Jeong Tae Ok, Colton Dorion, William Hendrickson, Kennan Marino, Reinhardy, Fariduzzuz, Yu Guo, Charles Watson, Midwestern State University, Wichita Falls, TX, United States*

**12:40pm**                    **Three-dimensional Full-Field Strain Mapping in Total Shoulder Replacement**  
**Poster Presentation.** IMECE2018-88902  
*Yuxiao Zhou, Chujie Gong, Penn State University, State College, PA, United States, Gregory Lewis, April Armstrong, College of Medicine Penn State University, Hershey, PA, United States, Jing Du, Penn State University, State College, PA, United States*

**12:45pm**                    **A Microfluidics-based Impedimetric Platform for Studying Placental Malaria**  
**Poster Presentation.** IMECE2018-88995  
*Jia Liu, Irina Oleinikov, Olga Chesnokov, Yuhao Qiang, Andrew Oleinikov, Sarah E Du, Florida Atlantic University, BOCA RATON, FL, United States*

**12:50pm**                    **Analysis of Precise-Drives for Bio-Instrumentation**  
**Poster Presentation.** IMECE2018-88999  
*Satya Prasad Paruchuru, VNRVJIET, Hyderabad, India*

**12:55pm**                    **Unconventional Machining Methods for Bioengineering**  
**Poster Presentation.** IMECE2018-89017  
*Satya Prasad Paruchuru, VNRVJIET, Hyderabad, India*

**Draft Program**

**1:00pm Manufacturing and Maintenance Aspects of Processes used for Prostheses**

Poster Presentation. IMECE2018-89019

*Satya Prasad Paruchuru, VNRVJIET, Hyderabad, India*

**1:05pm Manufacturing and Continuous-Evaluation of Tissue**

Poster Presentation. IMECE2018-89078

*Satya Prasad Paruchuru, VNRVJIET, Hyderabad, India*

**1:10pm Protective Capabilities of Metal-Frame Versus Plastic-Frame Softball Fielder's Masks**

Poster Presentation. IMECE2018-89084

*John Strickland, Grant Beville, University of North Florida, Jacksonville, FL, United States*

**1:15pm COMPUTATIONAL MODELING OF COUGH AND MUCUS CLEARANCE IN PATIENTS WITH TOTAL LARYNGECTOMY UNDER EXPIRATORY MUSCLE STRENGTH TRAINING**

Poster Presentation. IMECE2018-89086

*Nadun Kuruppumullage, University of Central Florida, OVIEDO, FL, United States*

**1:20pm Robust Control Design for Type 1 Diabetes**

Poster Presentation. IMECE2018-89246

*Souransu Nandi, University At Buffalo, Buffalo, NY, United States, Tarunraj Singh, Suny At Buffalo, Buffalo, NY, United States*

**1:25pm Is cell alignment modulated by cell-matrix interaction or cell-cell interaction?**

Poster Presentation. IMECE2018-89247

*Stephen Coyle, Carnegie Mellon University, Pittsburgh, PA, United States, Philip R. LeDuc, Carnegie Mellon Univ, Pittsburgh, PA, United States, Kuen Hsia, Carnegie Mellon University, Pittsburgh, PA, United States*

**1:30pm Biological Inspiration from Salt-exclusion in Mangroves Toward Anti-biofouling Reverse Osmosis Membranes**

Poster Presentation. IMECE2018-89303

*Adam Wood, Carnegie Mellon University, Verona, PA, United States, Kyle Justus, Eric Parigoris, Alan Russell, Carnegie Mellon University, Pittsburgh, PA, United States, Philip R. LeDuc, Carnegie Mellon Univ, Pittsburgh, PA, United States*

**1:35pm In Situ Bioprinting of Bone Tissue Constructs For Craniomaxillofacial Repair**

Poster Presentation. IMECE2018-89380

*KAZIM KERIM MONCAL, Pennsylvania State University, State College, PA, United States*

**1:40pm 3D tumor-on-a-chip with vasculature for chemotaxis**

Poster Presentation. IMECE2018-89441

*Li Wan, Carnegie Mellon University, Pittsburgh, PA, United States, Philip R. LeDuc, Carnegie Mellon Univ, Pittsburgh, PA, United States, Carola Neumann, University of Pittsburgh, Pittsburgh, PA, United States*

**1:45pm Mechanically-induced Cholesterol Removal from Macrophage Cells Using Ultrasound**

Poster Presentation. IMECE2018-89498

*Justin Urso, University of Central Florida, Orlando, FL, United States, Chandrakala Aluganti Narasimhulu, Sampath Parthasarathy, UCF, Orlando, FL, United States, Alain Kassab, Univ Of Central Florida, Orlando, FL, United States, Subith Vasu, University of Central Florida, Orlando, FL, United States*

**1:50pm A nerve-integrated 3D Tissue on a Chip system to study the brain**

Poster Presentation. IMECE2018-89626

*Justin Bobo, Carnegie Mellon University, Pittsburgh, PA, United States, Manoj Puthenveedu, Zara Weinberg, University of Michigan, Ann Arbor, MI, United States, Philip R. LeDuc, Carnegie Mellon Univ, Pittsburgh, PA, United States*

**1:55pm Optimization of Storage Conditions and Evaluation of Stored Drug Reducing Polymer (DRP) Solutions Used in Preclinical Animal Studies**

Poster Presentation. IMECE2018-89806

*Dan Crompton, Sarah Tolaymat, Salim Olia, Marina Kameneva, University of Pittsburgh, Pittsburgh, PA, United States*

**2:00pm Switching super twisting sliding mode Controller for following Virtual Constraints: Application to a Hybrid Neuroprosthesis**

Poster Presentation. IMECE2018-89892

*Vahidreza Molazadeh, Zhiyu Sheng, Nitin Sharma, University of Pittsburgh, Pittsburgh, PA, United States*

**2:05pm PhysioNet-LabView Interface**

Poster Presentation. IMECE2018-89959

*Andrew-Dave E. Simpson, Douglas E. Dow, Wentworth Institute of Technology, Boston, MA, United States*

## 16-5 DESIGN, RELIABILITY, SAFETY, AND RISK

### 16-5-1 Design, Reliability, Safety, and Risk

11:30am - 2:30pm

**11:30am Analysis of Temperature Sensor Failure Mechanism for Semiconductor Front-end Equipment Using Finite Element Models.**

Poster Presentation. IMECE2018-89533

*SEUNG IL PARK, Jacobs somnic, Changwoon Han, The state university of New york, Korea, incheon, Korea (Republic)*

**1:00pm Emerging Trends in the Measurement of Engineered Surfaces in Aerospace and Weapons System from Rough to Nano Measurement Range**

Poster Presentation. IMECE2018-89983

*Devdas Shetty, University of District of Columbia, Washington DC, DC, United States, Pawan Tyagi, University of the District of Columbia, Washington, DC, United States*

## 16-6 DYNAMICS, VIBRATION, AND CONTROL

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### 16-6-1 Dynamics, Vibration, and Control

11:30am - 2:30pm

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**11:30am** **Commodities and Rail Damage**  
Poster Paper Publication. IMECE2018-86008  
*JosÉ A. Romero, Queretaro Autonomous University, San Juan del Rio, Queretaro, Mexico, Frank Otremba, Bundesanstalt f,r Materialforschung und -pr, fung, Berlin, Germany, Alejandro A. Lozano-Guzman, Applied Science and Advanced Technology Research Center Queretaro Unit, Queretaro, Mexico*

**11:55am** **The Higher Inharmonic Overtone Vibrations of a Piezoelectric Plate**  
Poster Presentation. IMECE2018-86622  
*ZI-GUI HUANG, National Formosa University, Yunlin County, Select State/Province, Taiwan, Ke-Cheng Zhuang, Chien-Cheng Yang, Taitien Electronics Co., Ltd., New Taipei City, Select State/Province, Taiwan*

**12:20pm** **Vibratory System Identification of 3D Printed Cantilever**  
Poster Paper Publication. IMECE2018-86840  
*Daniel Crifasi, Matthew Ergle, Huseyin Ozdes, Edmon Perkins, Auburn University, Auburn, AL, United States*

**12:45pm** **New mixed scheme for rotor blade structural load calculation**  
Poster Presentation. IMECE2018-88966  
*Jie Wu, Jiangsu University of Science & Technology, Zhenjiang, China*

**1:10pm** **Payload Design for Orbital Structural Health Monitoring Experiments**  
Poster Presentation. IMECE2018-89430  
*Arjun Tandon, Daniel Pacheco, Shane McKinney, Michael Underwood, Carl Bancroft, Douglas MacNinch, John Sanchez, New Mexico Institute of Mining and Technology, Socorro, NM, United States, Andrei Zagrai, New Mexico Institute of Mining & Technology, Socorro, NM, United States*

**1:35pm** **Bio-inspired High Aerodynamic Tail for Robot Reorientation and Stabilization**  
Poster Presentation. IMECE2018-89710  
*Cameron Selby, Carnegie Mellon University, Pittsburgh, PA, United States, Amir Patel, Johns Hopkins University, Baltimore, MD, United States, Peter Li, Aaron Johnson, Carnegie Mellon University, Pittsburgh, PA, United States*

**2:00pm** **Spring Mass Model Control for 3D Dynamic Running on the ATRIAS Biped**  
Poster Presentation. IMECE2018-89782  
*LIN SONG, William Martin, Hartmut Geyer, Carnegie Mellon University, PITTSBURGH, PA, United States*

## 16-7 ENGINEERING EDUCATION

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### 16-7-1 Engineering Education

11:30am - 2:30pm

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**11:30am** **Design and Control of a High Precision Laser-Cutting Machine**  
Poster Paper Publication. IMECE2018-88131  
*Mason Van Bibber, California State Polytechnic University, Pomona, POMONA, CA, United States, Behnam Bahr, California State Polytechnic Univ, Pomona, CA, United States*

**12:06pm** **Experience of Multiple Instructors About Student Presentation Based Teaching (SPET) Approach**  
Poster Paper Publication. IMECE2018-88410  
*Pawan Tyagi, Morris Thomas, Carl Moore, Pamela Hampton-Garland, Jiajun Xu, Lara Thompson, Sasan Haghani, University of the District of Columbia, Washington, DC, United States*

**12:42pm** **Student Presentation Based Teaching (SPET) Approach for Classes With Higher Enrollment**  
Poster Paper Publication. IMECE2018-88463  
*Pawan Tyagi, University of the District of Columbia, Washington, DC, United States*

**1:18pm** **A Portable Laboratory for Dynamic Systems and Controls**  
Poster Presentation. IMECE2018-89494  
*Yaoni Li, Carnegie Mellon University, Pittsburgh, PA, United States, Mark Medino, Carnegie Mellon University, Gibsonia, PA, United States*

**1:54pm** **Use of Advanced Manufacturing for Better Tooling Performance in the Capstone Experience**  
Poster Presentation. IMECE2018-89729  
*Hazel Marie, Youngstown State University, Boardman, OH, United States, Stefan Moldovan, Youngstown State University, Youngstown, OH, United States*

## 16-8 ENERGY

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### 16-8-1 Energy

11:30am - 2:30pm

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**11:30am** **OPTIMIZATION OF HOT SIDE HOUSING COMPONENT FOR A ROTARY DISPLACER STIRLING ENGINE**  
Poster Presentation. IMECE2018-87981  
*William C. Mullins, Amirhossein Bagheri, Phillip R. Foster, Huseyin Bostanci, University of North Texas, Denton, TX, United States*

- 11:38am** **Conductive Heating of Li-Ion Batteries at Low Temperatures**  
Poster Paper Publication. IMECE2018-88235  
*Zhibang Xu, Meng Xu, Oakland university, Rochester Hills, MI, United States, Xia Wang, Oakland Univ, Rochester, MI, United States, Peng Zhao, Oakland University, Rochester Hills, MI, United States*
- 11:46am** **Development Of A Self-Sustaining Water Distillation System Using Activated Carbon Nanofluids**  
Poster Presentation. IMECE2018-88756  
*Ashreet Mishra, Purdue University Northwest, Hammond, IN, United States, A. G. Agwu Nnanna, University of Texas of the Permian Basin, Odessa, TX, United States*
- 11:54am** **Rack Level cooling of a Dynamic Cold plate using self regulating flow control device.**  
Poster Presentation. IMECE2018-88832  
*Amrutha Rachakonda, The University Of Texas at Arlington, Arlington, TX, United States, Rajesh Kasukurthy, The University of Texas Arlington, Arlington, TX, United States, Dereje Agonafer, University of Texas At Arlington, Arlington, TX, United States*
- 12:02pm** **Influence of the Tilt Angle of All-Glass Vacuum Tube Collectors on the Thermal Performance of Tube Solar Water Heaters**  
Poster Presentation. IMECE2018-88985  
*Elder Mendoza, Universidad Nacional de Trujillo, Trujillo, Peru*
- 12:10pm** **Performance Improvement of Cathode Electrodes in Lithium Ion Batteries by Nanoscale Surface Engineering via Chemical Vapor Deposition Polymerization**  
Poster Presentation. IMECE2018-89113  
*Laisuo Su, Phil M Smith, Dr. Keeja Jayan, CARNEGIE MELLON UNIVERSITY, PITTSBURGH, PA, United States*
- 12:18pm** **Numerical and Experimental Investigation of Effects of Metal Foam on the Melting of PCM inside a Horizontal Cylinder**  
Poster Presentation. IMECE2018-89114  
*Saurabh Mali, University of Michigan Dearborn, Dearborn, MI, United States, Subrata Sengupta, Univ Of Michigan, Dearborn, MI, United States, Suvil C Kundapur, Abhishek Mangoli, University of Michigan Dearborn, Dearborn, MI, United States*
- 12:26pm** **Numerical and Experimental Investigation of Effects of Metal Foam on the Melting of PCM inside a Horizontal Cylinder**  
Poster Presentation. IMECE2018-89115  
*Saurabh Mali, University of Michigan Dearborn, Dearborn, MI, United States, Subrata Sengupta, Univ Of Michigan, Dearborn, MI, United States, Suvil C Kundapur, Abhishek Mangoli, University of Michigan Dearborn, Dearborn, MI, United States*
- 12:34pm** **PRACTICAL BENEFIT ANALYSIS OF HEAT RECOVERY FOR MULTI-STAGE AIR COMPRESSORS**  
Poster Presentation. IMECE2018-89160  
*Yiming Ma, Yi Chu, FS-Elliott CN Co., Shanghai, Select State/Province, China, Rongxin Zhang, Brad Hayes, FS-Elliott LLC, Export, PA, United States, Xuyang Chi, FS-Elliott CN Co., Shanghai, Shanghai, China*
- 12:42pm** **A novel method to store thermal energy in a BTES system**  
Poster Presentation. IMECE2018-89275  
*Seung Joo Lee, Korea Institute of Science and Technology, Seoul, Seoul, Korea (Republic), Sarnng Woo Karng, Korea Inst Of Science & Tech, Seoul 130 650, Seoul, Korea (Republic), Jinsoo Park, Korea Institute of Science and Technology, Seoungbook-gu, Seoul, Korea (Republic), Sungho Choi, Syngkyunkwan University, Suwon, Korea (Republic)*
- 12:50pm** **Analysis of Cytochrome C Oxidase Oxygen Reduction Reaction to Develop a Catalyst for Hydrogen Fuel Cells**  
Poster Presentation. IMECE2018-89333  
*Rudy Torres, Carnegie Mellon University, Pittsburgh, PA, United States, Philip R. LeDuc, Carnegie Mellon Univ, Pittsburgh, PA, United States*
- 12:58pm** **New Decal Transfer Method for the Fabrication of PGM-free Polymer Electrolyte Fuel Cell**  
Poster Presentation. IMECE2018-89375  
*Yuqi Guo, Leiming Hu, Aman Uddin, Carnegie Mellon University, Pittsburgh, PA, United States, Hanguang Zhang, Gang Wu, University at Buffalo, Buffalo, NY, United States, Shawn Litster, Carnegie Mellon University, Pittsburgh, PA, United States*
- 1:06pm** **Influence of ionomer on platinum group metal-free catalyst activity as evaluated by rotating disk electrode measurements**  
Poster Presentation. IMECE2018-89422  
*Xiaomin Xu, Aman Uddin, Jonathan Braaten, Carnegie Mellon University, Pittsburgh, PA, United States, Hanguang Zhang, Gang Wu, University at Buffalo, Buffalo, NY, United States, Shawn Litster, Carnegie Mellon University, Pittsburgh, PA, United States*
- 1:14pm** **In-operando Imaging of Copper Dendrites Growth Based on Planar Micro-cell Using Ultra-high Resolution X-ray Computed Tomography**  
Poster Presentation. IMECE2018-89462  
*Hanwei Zhou, Tianwen Chen, Paul Choi, Bharathy Parimalam, Yubai Li, Shawn Litster, Carnegie Mellon University, Pittsburgh, PA, United States*
- 1:22pm** **Design of a borehole thermal energy storage system**  
Poster Presentation. IMECE2018-89474  
*Sarnng Woo Karng, Korea Inst Of Science & Tech, Seoul 130 650, Seoul, Korea (Republic), Jinsoo Park, Korea Institute of Science and Technology, Seoungbook-gu, Seoul, Korea (Republic), Seung Joo Lee, Korea Institute of Science and Technology, Seoul, Seoul, Korea (Republic)*
- 1:30pm** **CFD study of the dual vertical axis wind turbine**  
Poster Presentation. IMECE2018-89571  
*Shreyas P Shetty, Manipal Academy of Higher Education, Hyderabad, Telangana, India*
- 1:38pm** **Carbon-Based Nanomaterials for Surface Properties and Energy Storage**  
Poster Presentation. IMECE2018-89573  
*Ziyu Zhou, Tongchuan Gao, Paul Leu, University of Pittsburgh, Pittsburgh, PA, United States*

**1:46pm**      **Hardware and software development for telemetry-intensive solar forecasting**

**Poster Presentation.** IMECE2018-89846

*Hugo T.C. Pedro, David Larson, Jeremy Orosco, University of California San Diego, La Jolla, CA, United States, Carlos Coimbra, University of California San Diego, San Diego, CA, United States*

**1:54pm**      **Direct Spectral Estimation of Cloud Optical Properties from GOES-R Imagery**

**Poster Presentation.** IMECE2018-89853

*David Larson, Mengying Li, Hugo T.C. Pedro, University of California San Diego, La Jolla, CA, United States, Carlos Coimbra, University of California San Diego, San Diego, CA, United States*

**2:02pm**      **Transition metal dichalcogenides (TMDs) for application as supercapacitor electrodes**

**Poster Presentation.** IMECE2018-89877

*Kennith Mcloud, Jonathan Turnley, Santanu Mukherjee, Zhongkan Ren, Gurpreet Singh, Kansas State University, Manhattan, KS, United States*

**2:10pm**      **Optimization of Nano-Texturing Parameters to Maximize the Light Trapping of Thin Film Solar Cells**

**Poster Presentation.** IMECE2018-90019

*Ola Rashwan, Penn State University, Middletown, PA, United States, Nur Khairina Khairu Najhan, Penn State - Harrisburg, Middletown, PA, United States, Andrew Newill, Penn State-Harrisburg, Middletown, PA, United States*

## 16-9 FLUIDS ENGINEERING

### 16-9-1 Fluids Engineering

**11:30am - 2:30pm**

**11:30am**      **Modeling and Simulation of Laser Fabrication of Microfluidic Channels**

**Poster Presentation.** IMECE2018-86951

*Mohammad Hossan, matthew Benton, Haley Allen, Abdellah Ait Moussa, University of Central Oklahoma, Edmond, OK, United States*

**12:00pm**      **Experimental Facility Design for Air-Water Two Phase Flow Phenomena Measurement in Research Reactor Cooling System**

**Poster Presentation.** IMECE2018-87308

*Ki-Jung Park, Minkyu Jung, Kyoungwoo Seo, Seong Hoon Kim, Korea Atomic Energy Research Institute, Daejeon, OO, Korea (Republic)*

**12:30pm**      **Numerical Examination of Jets Induced by Multi-Bubble Interactions**

**Poster Paper Publication.** IMECE2018-87606

*Joydip Mondal, Arpit Mishra, Rajaram Lakkaraju, Parthasarathi Ghosh, Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

**1:00pm**      **Proper Orthogonal Decomposition Applied to a Convergent Shock Wave Dynamically Interacting with a Cylindrical Density Interface**

**Poster Presentation.** IMECE2018-88175

*Erik Proano, Dongeun Seo, Bertrand Rollin, Embry-Riddle Aeronautical University, Daytona Beach, FL, United States*

**1:30pm**      **Droplet Nucleation and Growth in Cryogenic Turboexpanders**

**Poster Paper Publication.** IMECE2018-88343

*Ashish Alex Sam, Keerthi Raj Kunniyoor, IIT Kharagpur, Kharagpur, West Bengal, India, Jayachandran K N, Indian Institute of Technology (IIT) Kharagpur, Kharagpur, West Bengal, India, Arpit Mishra, IIT Kharagpur, Kharagpur, West Bengal, India, Parthasarathi Ghosh, Indian Institute of Technology Kharagpur, Kharagpur, West Bengal, India*

**2:00pm**      **Numerical Analysis of Heat Transfer and Fluid Flow in Micro-Welding Using CFD**

**Poster Paper Publication.** IMECE2018-86363

*Divyaj Shah, Indian Institute of Technology, Bombay, Pune, Maharashtra, India, Chandrashekhkar M Sewatkar, College of Engineering, Pune, Pune, Maharashtra, India, Ketaki Godbole, Bajaj Auto Ltd., Pune, Pune, Maharashtra, India*

## 16-10 HEAT TRANSFER AND THERMAL ENGINEERING

### 16-10-1 Heat Transfer and Thermal Engineering

**11:30am - 2:30pm**

**11:30am**      **Realization of energy-saving glass using photonic crystals**

**Poster Presentation.** IMECE2018-86185

*Yen-Hsiang Chen, National Tsing Hua University, Hsinchu City, Select State/Province, Taiwan, Yu-bin Chen, National Tsing Hua University, Hsinchu, Taiwan*

**11:40am**      **Experimental studies of enhanced tubes for flooded evaporator using R-1233zd(E) refrigerant**

**Poster Presentation.** IMECE2018-86265

*Ho Won Byun, Dong Ho Kim, Korea Institute of Machinery and Materials, Daejeon, Korea (Republic), Seok Ho Yoon, KIMM, Daejeon, Korea (Republic), Chan Ho Song, Kong Hoon Lee, Ook Joong Kim, Korea Institute of Machinery and Materials, Daejeon, Korea (Republic)*

**11:50am**      **NUMERICAL AND EXPERIMENTAL INVESTIGATIONS OF COMBUSTION AND NO<sub>x</sub> EMISSION CHARACTERISTICS OF A 330MW UTILITY BOILER WITH SWIRL BURNERS**

**Poster Presentation.** IMECE2018-86777

*Wenhua Liu, The University of Shanghai for Science and Technology, Shanghai, China, China, Mo Yang, University of Shanghai for Science and Technology, Shanghai, China, Yuwen Zhang, University Of Missouri, Columbia, MO, United States, Zheng Li, Department of Mechanical and Aerospace Engineering, University of Missouri, Columbia, MO, United States, Hong Jin, Wenshuai Wang, University of Shanghai for Science and Technology, Shanghai, China*

Draft Program

**12:00pm**                    **Quantifying uncertainty in first-principles predictions of phonon dispersion relations**

**Poster Presentation.** IMECE2018-87933

*Holden Parks, Venkat Viswanathan, Carnegie Mellon University, Pittsburgh, PA, United States, Alan McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States*

**12:10pm**                    **Visualization of Nanoengineered Coating Longevity during Condensation**

**Poster Presentation.** IMECE2018-88077

*Muhammad Jahidul Hoque, University of Illinois Urbana-Champaign, Urbana, IL, United States, Longnan Li, University of Illinois, Urbana, IL, United States, Nenad Miljkovic, University of Illinois At Urbana-Champaign, Urbana, IL, United States*

**12:20pm**                    **Individual Phonon Branch Contribution to Thermal Conductivity of 3C-SiC Using the Monte Carlo Method**

**Poster Paper Publication.** IMECE2018-88083

*Arden Barnes, Nicholas Roberts, Utah State University, Logan, UT, United States*

**12:30pm**                    **Flow and Heat Transfer of Mist/Steam Two-Phase Flow in Two-Pass Rectangular Channels With Paralleled and V-Shaped Rib Turbulators**

**Poster Paper Publication.** IMECE2018-88532

*Guangwen Jiang, Xi'an Jiaotong University, Xi'an, Shaanxi, Shaanxi, China, Jianmin Gao, Xiaojun Shi, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Zhao Wang, Yunlong Li, State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, Xi'an, China*

**12:40pm**                    **Experimental Investigation of an R134a Loop Thermosiphon for Shift Cooling**

**Poster Paper Publication.** IMECE2018-88538

*Fajing Li, Jianmin Gao, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Liang Xu, State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Feng Liang, Xi'an Jiaotong University, Xi'an, Shaanxi, China, Guangwei Jiang, State Key Laboratory for Manufacturing Systems Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi, China*

**12:50pm**                    **Investigation of Cure process of Carbon Epoxy Composite Block**

**Poster Presentation.** IMECE2018-88758

*Kibum Kim, Chungbuk National University, Cheongju Chungbuk, Korea (Republic), JinSang Yoon, Chungbuk National University, Cheongju, Korea (Republic)*

**1:00pm**                    **Total variation regularization for Temperature Field Reconstruction Based on the Light-Field Imaging Technique**

**Poster Presentation.** IMECE2018-88786

*Xing Huang, Hong Qi, Xiang-Yang An, Li-Ming Ruan, Harbin Institute of Technology, Harbin, China*

**1:10pm**                    **The Origin of Hydrophilic Surface Functionalization-Induced Thermal Conductance Enhancement across Solid-Water Interfaces**

**Poster Presentation.** IMECE2018-89075

*Dezhao Huang, RUIMIN MA, university of notre dame, south bend, IN, United States, Teng Zhang, Schrodinger Inc., New York, NY, United States, Tengfei Luo, University of Notre Dame, Notre Dame, IN, United States*

**1:20pm**                    **Thermal Transport of Fullerene-based Superatomic Crystals Controlled by Orientational Disorder**

**Poster Presentation.** IMECE2018-89253

*Matthew Bartnof, Alexander D. Christodoulides, Carnegie Mellon University, Pittsburgh, PA, United States, Wee-Liat Ong, Zhejiang University, Haining, Zhejiang, China, Evan O'Brien, Xavier Roy, Columbia University Department of Chemistry, New York, NY, United States, Alan McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States, Jonathan Malen, Carnegie Mellon University, Pittsburgh, PA, United States*

**1:30pm**                    **The effect of adhesion layer on the thermal boundary conductance**

**Poster Presentation.** IMECE2018-89406

*Kiumars Aryana, Rouzbeh Rastgar, David Olson, John Gaskins, Ashutosh Giri, Pamela M. Norris, Patrick E. Hopkins, University of Virginia, Charlottesville, VA, United States*

**1:40pm**                    **Nanoscale to Megascale Thermal Engineering: A Path to Sustainable Energy**

**Poster Presentation.** IMECE2018-89715

*Bikram Bhatia, Massachusetts Institute of Technology, Cambridge, MA, United States*

**1:50pm**                    **Metal Sulfides For Thermochemical Energy Storage**

**Poster Presentation.** IMECE2018-89779

*Gwendolyn Wang, University of California, San Diego, San Diego, CA, United States*

**2:00pm**                    **Heterogeneous Monolayer Wick Structures for High Heat Flux Thermal Management Systems**

**Poster Presentation.** IMECE2018-89957

*Nathan Albright, Athul J. Pai, Giseuk Hwang, Wichita State University, Wichita, KS, United States*

**2:10pm**                    **Enhanced Flow Boiling using Columnar-Post Wick**

**Poster Presentation.** IMECE2018-89971

*Athul J. Pai, Yahya NaserSharifi, Giseuk Hwang, Wichita State University, Wichita, KS, United States*

**2:20pm**                    **Advanced Passive Thermal Management of Li-Ion Batteries Operating at Various Environmental Temperatures**

**Poster Presentation.** IMECE2018-89999

*Derek Barnes, Xianglin Li, University of Kansas, Lawrence, KS, United States*

## 16-11 MATERIALS: GENETICS TO STRUCTURES

### 16-11-1 Materials: Genetics to Structures

11:30am - 2:30pm

**11:30am Metal-Organic-Frameworks as Efficient Electrocatalysts for Oxygen Evolution Reaction: Insights into the Active Centers**

Poster Presentation. IMECE2018-86176

*Chun-Yu Lin, University of North Texas, Denton, TX, United States, Shuangyin Wang, Hunan University, Changsha, China, Zhenhai Xia, University of North Texas, Denton, TX, United States*

**11:50am Molecular Dynamics Simulation for Dislocation on Lead Titanate Films**

Poster Presentation. IMECE2018-86882

*Cooper Gray, Razak Adeniji, Zhi Wang, University of St. Thomas, St. Paul, MN, United States, Jeong Ho You, University of St Thomas, Woodbury, MN, United States*

**12:10pm "First-Principle Investigation of Structural, Elastic, Electronic and Thermal Properties of Dysprosium Hafnate Oxides"**

Poster Paper Publication. IMECE2018-87099

*Hui Niu, Ansys Inc, Canonsburg, PA, United States*

**12:30pm Effect of Nano Silica on Compressive Strength of Concrete**

Poster Paper Publication. IMECE2018-87799

*Waleed Ahmed, United Arab Emirates University, Al Ain, United Arab Emir., Wail Al-Rifaie, Abdalmjeed Alawaneh, Mohammed Al-Bajawi, Philadelphia University, Amman, Jordan*

**12:50pm study of buckling of plate under shear compared under compression results**

Poster Presentation. IMECE2018-87986

*Sadek Salem Cherif, University of Sciences and Technology of Oran Mohamed Boudiaf, Tizi Ouzou, DO Algeria*

**1:10pm Effect of stress triaxiality on creep deformation and damage in Mod.9Cr-1Mo Steel**

Poster Presentation. IMECE2018-88957

*Katsutaka YAMADA, Chiba Institute of Technology, Funabashi, Chiba, Japan, Takashi Ogata, Chiba Institute of Technology, Chiba, Japan*

**1:30pm Creep Strength Evaluation of Long-Term Used Welded Joint on Mod.9Cr-1Mo Steel by Using a Miniature Specimen**

Poster Presentation. IMECE2018-89002

*Hiroki YAMAZAKI, Chiba Institute of Technology, Narashino, Japan, Takashi Ogata, Chiba Institute of Technology, Chiba, Japan*

**1:50pm Investigation of Mechanical Strength of Gallium Based Alloys**

Poster Presentation. IMECE2018-89094

*Courtney Titus, Stephen P Stagon, University of North Florida, Jacksonville, FL, United States*

**2:10pm Crack Paths in Anisotropic Biomimetic Composites Textured by Magnetic Nanoparticles**

Poster Presentation. IMECE2018-89964

*Chunzhou Pan, Ata Mesgarnejad, Sandra Shefelbine, Alain Karma, Randall Erb, Northeastern University, Boston, MA, United States*

**16-12 MECHANICS OF SOLIDS, STRUCTURES AND FLUIDS**

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**16-12-1 Mechanics of Solids, Structures and Fluids**

**11:30am - 2:30pm**

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**11:30am Experimental investigation on dynamic fracture behavior of 5A06 aluminum alloy**

Poster Presentation. IMECE2018-88879

*Peng Ren, Jiangsu University of Science & Technology, Zhenjiang, China*

**12:00pm Development of a Moving Window Molecular Dynamics Framework to Model Shock Wave Interaction at Microstructural Features**

Poster Presentation. IMECE2018-89306

*Alexander Davis, Vinamra Agrawal, Auburn University, Auburn, AL, United States*

**12:30pm Mesoscopic modelling of carbon nanotube thin films with covalent cross-links**

Poster Presentation. IMECE2018-89373

*Md Abu Horaira Banna, The University of Alabama, Tuscaloosa, AL, United States, Alexey Volkov, University of Alabama, Tuscaloosa, AL, United States*

**1:00pm Modifying the Mechanical Response of a Cold Drawing Polymer Film by the Addition of a Perfectly Bonded Hyperelastic Layer**

Poster Presentation. IMECE2018-89377

*Rahul Chopra, Ramachandran Hariharakrishnan S, Steven D Abramovitch, Spandan Maiti, Sachin S Velankar, University of Pittsburgh, Pittsburgh, PA, United States*

**1:30pm Simple Model for Tool Interaction on a Continuously Deformable Environment**

Poster Presentation. IMECE2018-89452

*Wooshik Kim, Aaron Johnson, Carnegie Mellon University, Pittsburgh, PA, United States*

**2:00pm Computational Modeling Of Electrically Actuated Shape Memory Polymers**

Poster Presentation. IMECE2018-89927

*Midhan Siwakoti, Russell Mailen, Auburn University, Auburn, AL, United States*

**16-13 SOCIETY-WIDE MICRO AND NANOTECHNOLOGY FORUM**

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**16-13-1 Society-Wide Micro and Nanotechnology Forum**

**11:30am - 2:30pm**

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**11:30am** **Systematic Analysis of Pattern Precision and Uniformity in Roll-to-Roll Colloidal Assembly System**

Poster Presentation. IMECE2018-88840

*I-Te Chen, Elizabeth Schappell, Xiaolong Zhang, Chih-Hao Chang, North Carolina State University, Raleigh, NC, United States*

**11:33am** **Tensile Properties of P3HT:PCBM Bulk-heterojunction Thin Films by Coarse-Grained Molecular Dynamics**

Poster Presentation. IMECE2018-88872

*Joydeep Munshi, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States*

**11:36am** **Role of Processing on the Morphology of P3HT:PCBM Bulk-heterojunction Thin Films by Coarse-grained Molecular Simulations**

Poster Presentation. IMECE2018-88873

*Joydeep Munshi, Lehigh University, Bethlehem, PA, United States, Umar Farooq Ghumman, Northwestern University, Evanston, IL, United States, Akshay Iyer, Northwestern University, Evanston, IL, United States, Rabindra Dulal, University of Wyoming, Laramie, WY, United States, Wei Chen, Northwestern University, Evanston, IL, United States, TeYu Chien, University of Wyoming, Laramie, WY, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States*

**11:39am** **Role of Polydispersity on the Morphology of P3HT:PCBM Organic Solar Cells by Coarse-grained Molecular Simulations**

Poster Presentation. IMECE2018-88874

*Joydeep Munshi, Lehigh University, Bethlehem, PA, United States, Umar Farooq Ghumman, Northwestern University, Evanston, IL, United States, Akshay Iyer, Northwestern University, Evanston, IL, United States, Rabindra Dulal, University of Wyoming, Laramie, WY, United States, Wei Chen, Northwestern University, Evanston, IL, United States, TeYu Chien, University of Wyoming, Laramie, WY, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States*

**11:42am** **Large-scale Dynamic Energy Driven Assembly of Two-Dimensional Layered Materials on polymer substrate**

Poster Presentation. IMECE2018-88882

*Dong Zhou, Bo Li, Villanova University, Villanova, PA, United States*

**11:45am** **Magnetically actuated dynamic iridescence inspired by the neon tetra**

Poster Presentation. IMECE2018-88898

*Zhiren Luo, North Carolina State University, Raleigh, NC, United States, Benjamin Evans, Elon University, Elon, NC, United States, Chih-Hao Chang, North Carolina State University, Raleigh, NC, United States*

**11:48am** **The Stability and Diffusion of Lithium Affected by a  $60^\circ$  Shuffle Dislocation in Silicon**

Poster Presentation. IMECE2018-88923

*Wei Zhao, Jiangsu University of Science and Technology, Zhenjiang, China*

**11:51am** **Heat Transfer across 3C-SiC-water Interfaces: Solid-Liquid Affinity, Interfacial Structuring, and Spectral Characteristics**

Poster Presentation. IMECE2018-88943

*C. Ulises Gonzalez-Valle, Penn State University, State College, PA, United States, Bladimir Ramos, Penn State University, University Park, PA, United States*

**11:54am** **Determining influential descriptors for polymer chain conformation based on empirical force-fields and molecular dynamics simulations**

Poster Presentation. IMECE2018-88958

*RUIMIN MA, University of Notre Dame, South Bend, IN, United States, Tengfei Luo, University of Notre Dame, Notre Dame, IN, United States*

**11:57am** **Multiscale Modeling of PEEK using Reactive Molecular Dynamics Modeling and Micromechanics**

Poster Presentation. IMECE2018-88967

*Will Pisani, Matthew Radue, Michigan Technological University, Houghton, MI, United States, Sorayot Chinkanjanarot, National Metals and Materials Technology Center, Khlong Nueng, Pathum Thani, Thailand, Brett A. Bednarczyk, Evan Pineda, NASA Glenn Research Center, Cleveland, OH, United States, Kevin Waters, Ravindra Pandey, Julie King, Michigan Technological University, Houghton, MI, United States, Gregory Odegard, Michigan Tech Univ, Houghton, MI, United States*

**12:00pm** **Demonstration of the Magnetic Polaritons in Deep AI Gratings in Off-Plane Layout**

Technical Presentation. IMECE2018-88977

*Peiyan Yang, Zhuomin Zhang, Georgia Institute of Technology, Atlanta, GA, United States, Hong Ye, University of Science and Technology of China, Hefei, CO, China*

**12:03pm** **Achieving Low Lattice Thermal Conductivity by Stereochemically Activating Lone-pair Electrons: a Case Study of Boron Arsenide**

Technical Presentation. IMECE2018-89003

*Guangzhao Qin, University of South Carolina, Columbia, SC, United States, Zhenzhen Qin, Zhengzhou University, Zhengzhou, Henan, China, Huimin Wang, Northeastern University, Shenyang, Liaoning, China, Ming Hu, University of South Carolina, Columbia, SC, United States*

**12:06pm** **External Electric Field Driving the Ultra-low Thermal Conductivity of Silicene**

Technical Presentation. IMECE2018-89004

*Guangzhao Qin, Ming Hu, University of South Carolina, Columbia, SC, United States*

**12:09pm** **A Modified Theoretical Model to Accurately Account for Interfacial Roughness in Predicting the Interfacial Thermal Conductance**

Poster Presentation. IMECE2018-89040

*Yingying Zhang, University of Minnesota, St. Paul, MN, United States, Dengke Ma, Yi Zang, Huazhong University of Science and Technology, Wuhan, China, Xiaojia Wang, University of Minnesota, Minneapolis, MN, United States, Nuo Yang, Huazhong University of Science and Technology, Wuhan, Hubei, China*

**12:12pm Thermal Transport in ZnO Nanocrystal Networks Synthesized by Nonthermal Plasma**

Poster Presentation. IMECE2018-89041

*Xuewang Wu, Ben Greenberg, University of Minnesota, Minneapolis, MN, United States, Yingying Zhang, University of Minnesota, St. Paul, MN, United States, Uwe Kortshagen, James Kakalios, Eray S. Aydil, Xiaojia Wang, University of Minnesota, Minneapolis, MN, United States*

**12:15pm Enhancing Light Transmission in Nacre-Inspired Multilayer Composites using Interfacial Nanostructures**

Poster Presentation. IMECE2018-89093

*Yi-An Chen, Chih-Hao Chang, North Carolina State University, Raleigh, NC, United States, Sharan/ S.V. Naidu, GlobalFoundries, Raleigh, NC, United States, Zhiren Luo, North Carolina State University, Raleigh, NC, United States*

**12:18pm Failure Prediction Using Gibbs Formulation of Granular Micromechanics**

Poster Presentation. IMECE2018-89208

*Anil Misra, Rizacan Sarikaya, University of Kansas, Lawrence, KS, United States, Payam Poorolajouy, Purdue University, West Lafayette, IN, United States*

**12:21pm Tunable Near-field Radiative Heat Transfer by Electrically Gating Monolayer Graphene**

Poster Presentation. IMECE2018-89214

*Xiaoyan Ying, Liping Wang, Arizona State University, Tempe, AZ, United States*

**12:24pm Thermochromic VO<sub>2</sub>-Based Variable Emittance Coatings for Spacecraft Thermal Control**

Poster Presentation. IMECE2018-89217

*Sydney Taylor, Liping Wang, Arizona State University, Tempe, AZ, United States*

**12:27pm Combined effects of liquid wicking and hydrodynamic instability on pool boiling critical heat flux by two-tier structures of nanowires and microgrooves**

Poster Presentation. IMECE2018-89226

*Guanglei Chen, Calvin Hong Li, Villanova University, Villanova, PA, United States*

**12:30pm Local measurement of the evaporative heat transfer coefficient in thin films using Frequency Domain Thermoreflectance**

Poster Presentation. IMECE2018-89250

*Xiaoman Wang, Xiaoyue Zhao, Carnegie Mellon University, Pittsburgh, PA, United States, Alan McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States, Jonathan Malen, Carnegie Mellon University, Pittsburgh, PA, United States*

**12:33pm Synthesis and Characterization of Electrodeposited Ni-Co Core-Shell Nanowires**

Poster Presentation. IMECE2018-89321

*Ali Shiave, University of North Carolina at Greensboro, Greensboro, NC, United States, Ram Mohan, North Carolina A & T University, Greensboro, NC, United States*

**12:36pm Additive Manufacturing of Multi-material Micro Structural Features ? Comparison of Print Part Quality and Characteristics from Voxel and Stereolithography Digital Designs**

Poster Presentation. IMECE2018-89332

*Furkan Ulu, Ravi Pratap Singh Tomar, North Carolina A&T State University, Greensboro, NC, United States, Ram Mohan, North Carolina A & T University, Greensboro, NC, United States*

**12:39pm Additive Manufacturing Aids the Verification of Granular Micromechanics Model**

Poster Presentation. IMECE2018-89340

*Nima NejadSadeghi, Anil Misra, University of Kansas, Lawrence, KS, United States*

**12:42pm Tunable Granular Metamaterials Based Upon Wave Propagation Analysis Using Granular Micromechanics**

Poster Presentation. IMECE2018-89342

*Nima NejadSadeghi, Anil Misra, University of Kansas, Lawrence, KS, United States*

**12:45pm Experimental Measurement of the Spectrum of Near-Field Thermal Emission**

Poster Presentation. IMECE2018-89369

*Saman Zare, Carl Tripp, Sheila Edalatpour, University of Maine, Orono, ME, United States*

**12:48pm Wavevector and Polarization Resolved Analysis of Phonon Scattering from Embedded Nanoparticles**

Technical Presentation. IMECE2018-89410

*Ram Krishna, Joseph P. Fisher, University of Delaware, Newark, DE, United States*

**12:51pm Thermal Transport Across Gallium Oxide/Metal Interfaces**

Poster Presentation. IMECE2018-89509

*Henry Aller, Carnegie Mellon University, Pittsburgh, PA, United States, Alan McGaughey, Carnegie Mellon Univ, Pittsburgh, PA, United States, Jonathan Malen, Carnegie Mellon University, Pittsburgh, PA, United States, Andrew Gellman, Xiaoxiao Yu, Carnegie Mellon University, Pittsburgh, PA, United States*

**12:54pm Microfluidics to study multiscale porosity**

Poster Presentation. IMECE2018-89559

*Mohammad Mehdi Salek, ETH ZURICH, ZURICH, Switzerland, Jiande Zhou, EPFL, Lausanne, Switzerland, Roman Stocker, ETH Zurich, Zurich, Switzerland, Joaquin Jimenez-Martinez, ETH Zurich, Zurich, Switzerland*

**12:57pm Mechanical and Electrostatic Properties of Synthetic Collagen Molecules via Molecular Dynamics Modeling**

Poster Presentation. IMECE2018-89568

*Atul Rawal, Kristen Rhinehardt, North Carolina A&T State University, Greensboro, NC, United States, Ram Mohan, North Carolina A & T University, Greensboro, NC, United States*

Draft Program

**1:00pm Laser-induced surface treatment of PMMA for capillary driven flows**

Poster Presentation. IMECE2018-89601

*Md Shamim Mahmud, Bahador Farshchian, Texas State University, San Marcos, TX, United States, Hakjin Kim, Convert, Chuncheon, Korea (Republic), Hyunghoon Kim, Boditech Med, Chuncheon, Korea (Republic), Heonyoung Kim, Kangwon National University, Chuncheon, Korea (Republic), Namwon Kim, Texas State University, San Marcos, TX, United States*

**1:03pm Mechanical Behavior of Cement Paste at Nanoscale ? Experimental Characterization and Reactive Molecular Dynamics Modeling**

Poster Presentation. IMECE2018-89606

*Ingrid Padilla Espinosa, North Carolina A&T State University, Greensboro, NC, United States, Ram Mohan, North Carolina A & T University, Greensboro, NC, United States*

**1:06pm Suspended Thermo-Reflectance Measurements of the Thermal Properties of Silicon Micro and Nano-Cantilever Beams**

Poster Presentation. IMECE2018-89657

*Dipta Sarkar, Zayd Leseman, Kansas State University, Manhattan, KS, United States*

**1:09pm Deformable Shallow Microfluidics: Fluid Flow Rectification and Novel Particle Manipulation Platform**

Poster Presentation. IMECE2018-89661

*Aryan Mehboudi, Junghoon Yeom, Michigan State University, East Lansing, MI, United States*

**1:12pm Tailoring the property of nanocomposites using nickel coated carbon nanotube and magnetic field**

Poster Presentation. IMECE2018-89678

*Ahmed M Abdalla, Rakesh Sahu, McMaster University, Hamilton, ON, Canada, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

**1:15pm In Situ Contactless 3D Printing of Cellular Structures**

Poster Presentation. IMECE2018-89701

*Sarah Mishriki, Abdel Rahman Abdel Fattah, Elvira Meleca, McMaster University, Hamilton, ON, Canada, Tobias Kammann, Friedrich Schiller University Jena, Jena, Jena, Germany, Rakesh Sahu, Fei Geng, McMaster University, Hamilton, ON, Canada, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

**1:18pm Magnetic Antibody Functionalized Carbon Nanotube Ink for Rapid Printing of Biosensors**

Poster Presentation. IMECE2018-89703

*Sarah Mishriki, Abdel Rahman Abdel Fattah, Ahmed M Abdalla, Elvira Meleca, Fei Geng, Suvojit Ghosh, McMaster University, Hamilton, ON, Canada, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

**1:21pm Energy efficient metal mesh fog filters to simultaneously harness atmospheric fog-water and remove VOCs**

Poster Presentation. IMECE2018-89736

*Ritwick Ghosh, Rakesh Sahu, Igor Zhitomirsky, McMaster University, Hamilton, ON, Canada, Ranjan Ganguly, Jadavpur University, Kolkata, WEST BENGAL, India, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

**1:24pm Spatial Mapping and Analysis of Thermal Boundary Conductance of Metal/MoSe<sub>2</sub> Interfaces Using Time-Domain Thermoreflectance**

Poster Presentation. IMECE2018-89754

*David B. Brown, Georgia Institute of Technology, Atlanta, GA, United States, Xufan Li, Kai Xiao, David B. Geohegan, Oak Ridge National Laboratory, Oak Ridge, TN, United States, Satish Kumar, Georgia Institute of Technology, Atlanta, GA, United States*

**1:27pm Hundred-Fold Enhancement in Far-Field Radiative Heat Transfer Over the Blackbody Limit**

Poster Presentation. IMECE2018-89796

*Dakotah Thompson, Linxiao Zhu, Rohith Mittapally, Seid Sadat, University of Michigan, Ann Arbor, MI, United States, Zhen Xing, Patrick McArdle, Mumtaz Qazilbash, College of William and Mary, Williamsburg, VA, United States, Pramod Sangi Reddy, Edgar Meyhofer, University of Michigan, Ann Arbor, MI, United States*

**1:30pm ADVANCED FeOOH-MWCNTS COMPOSITE NEGATIVE ELECTRODES WITH HIGH AREAL CAPACITANCE FOR ASYMETRIC SUPERCAPACITORS**

Poster Presentation. IMECE2018-89817

*Ri Chen, Rakesh Sahu, Igor Zhitomirsky, McMaster University, Hamilton, ON, Canada, Ishwar K Puri, McMaster University, Hamilton, ON, Canada*

**1:33pm Conversion of Heat to Electricity Using a Nano Gap Near-field Thermophotovoltaic Device**

Poster Presentation. IMECE2018-89852

*Linxiao Zhu, Anthony Fiorino, Dakotah Thompson, Rohith Mittapally, Pramod Sangi Reddy, Edgar Meyhofer, University of Michigan, Ann Arbor, MI, United States*

**1:36pm Transient Thermoreflectance Techniques for Measuring Thermal Conductivity**

Poster Presentation. IMECE2018-89886

*Jihoon Jeong, The University of Texas At Austin, Austin, TX, United States, Yaguo Wang, University of Texas At Austin, Austin, TX, United States*

**1:39pm Comparison of Friction in Graphene Wrapped Nanodiamond and Graphitized Nanodiamond**

Poster Presentation. IMECE2018-89914

*Srilok Srinivasan, Iowa State University, Ames, IA, United States, Diana Berman, University of North Texas, Denton, TX, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Subramanian KRS Sankaranarayanan, Argonne National Laboratory, Lemont, IL, United States, Ali Erdemir, Argonne National Laboratory, Argonne, IL, United States, Anirudha Sumant, Argonne National Laboratory, Lemont, IL, United States*

**1:42pm Thermal Conductivity of Ga Doped Crystalline Si using Molecular Dynamics**

Poster Presentation. IMECE2018-89939

*Srilok Srinivasan, Iowa State University, Ames, IA, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Zayd Leseman, Kansas State University, Manhattan, KS, United States*

**1:45pm**            **Atomistic Modeling of Wetting and Evaporation on Nanostructured Printed Graphene**

**Poster Presentation.** IMECE2018-89963

*Srilok Srinivasan, Iowa State University, Ames, IA, United States, Ganesh Balasubramanian, Lehigh University, Bethlehem, PA, United States, Suprem Das, Kansas State University, Manhattan, KS, United States*

**1:48pm**            **Heat Transport Mechanism in 2D Hybrid Perovskite**

**Poster Presentation.** IMECE2018-89972

*MD ABU JAFAR RASEL, Joseph P. Feser, University of Delaware, Newark, DE, United States*

## **16-14 BEST STUDENT POSTER COMPETITION ON COMPUTATIONAL MECHANICS**

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**16-14-1 Best Student Poster Competition on Computational Mechanics**

**11:30am - 2:30pm**

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**11:30am**            **Peridynamic modeling of Intergranular Corrosion Damage**

**Poster Presentation.** IMECE2018-86735

*Siavash Jafarzadeh, University of Nebraska-Lincoln, Lincoln, NE, United States, Ziguang Chen, Huazhong University of Science and Technology, Wuhan, Hubei, China, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

**11:50am**            **Dynamic Fracture at an Interface: a Peridynamic Analysis**

**Poster Presentation.** IMECE2018-86936

*Javad Mehrmashhadi, Quang Le, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

**12:10pm**            **Sharp Volumetric Billboard Based Multilevel Multigrid Method**

**Poster Presentation.** IMECE2018-88073

*Dewen Yushu, Karel Matou?, University of Notre Dame, Notre Dame, IN, United States*

**12:30pm**            **Peridynamic modelling of crack nucleation**

**Poster Presentation.** IMECE2018-88164

*Sina Niazi, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

**12:50pm**            **The Peridynamic Coupling of Fracture, Diffusion, and Corrosion**

**Poster Presentation.** IMECE2018-88218

*Jiangming Zhao, Siavash Jafarzadeh, University of Nebraska-Lincoln, Lincoln, NE, United States, Ziguang Chen, Huazhong University of Science and Technology, Wuhan, Hubei, China, Florin Bobaru, University of Nebraska-Lincoln, Lincoln, NE, United States*

**1:10pm**            **Multiresolution Modeling and Error Control with an Adaptive Wavelet Algorithm**

**Poster Presentation.** IMECE2018-88289

*Cale Harnish, Karel Matou?, University of Notre Dame, Notre Dame, IN, United States, Daniel Livescu, Los Alamos National Lab, Los Alamos, NM, United States*

**1:30pm**            **Impact Induce Behavior of HTPB/HMX Based Energetic Materials using Cohesive Finite Element Method**

**Poster Presentation.** IMECE2018-88950

*Ayotomi Olokun, Chandra Prakash, Ibrahim Gunduz, Purdue University, West Lafayette, IN, United States, Vikas Tomar, Purdue University W Lafayette, W Lafayette, IN, United States*

**1:50pm**            **Lone-Pair Electrons Lead to Strong Phonon Anharmonicity and Anomalous Strain Enhancement of Thermal Conductivity**

**Poster Presentation.** IMECE2018-89005

*Guangzhao Qin, Ming Hu, University of South Carolina, Columbia, SC, United States*

**2:10pm**            **Multiscale Fracture Simulation Based On Coupled Space-Time Finite Element Method And Peridynamics**

**Poster Presentation.** IMECE2018-89258

*Rui Zhang, Shogo Wada, Clint Nicely, The University of Texas at Dallas, Richardson, TX, United States, Qian Qian, University of Texas at Dallas, Richardson, TX, United States*

**Draft Program**