

EMI 2016 and PMC 2016 Conferences  
TECHNICAL PROGRAM

**PLENARY LECTURES**

Monday, May 23, 8:15 AM – 9:15 AM

**Spatial and Temporal Multiscale Models for Advancing Integrated Computational Materials Engineering**

Somnath Ghosh, *Johns Hopkins University*

Monday, May 23, 1:00 PM – 2:00 PM

**Surrogate Models for Uncertainty Quantification and Reliability Analysis**

Bruno Sudret, *ETH Zurich*

Tuesday, May 24, 8:00 AM – 9:00 AM

**On the Complexity of Elastic Waves trapped in Convex Features**

Domniki Asimaki, *California Institute of Technology*

Tuesday, May 24, 1:00 PM – 2:00 PM

**The Changing Dynamic of Wind Effects on Structures: A Transition to a Non-Stationary, Non-Linear and Non-Gaussian Outlook**

Ahsan Kareem, *University of Notre Dame*

Wednesday, May 25, 8:00 AM – 9:00 AM

**Similarities and Differences Between MD and DEM Simulations: A Historical Perspective**

Otis Walton, *Lawrence Livermore National Laboratory*

Wednesday, May 25, 1:00 PM – 2:00 PM

**Structural Health Monitoring: Past, Present and Future**

## **PANEL SESSIONS (PMC 2016)**

Monday, May 23, 3:15 PM – 5:45 PM

**Materials Modeling**

Tuesday, May 24, 3:15 PM – 5:45 PM

**Industrial Applications of Probabilistic Methods**

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## **PARALLEL SESSIONS – MONDAY, MAY 23**

Parallel Session 1 – 9:45 AM – 11:30 AM

M-1-1 - EMI-MS-04: Multiscale Behavior of Damage and Failure Mechanics
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9:45 AM – 11:30 AM
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**575: Assembly of Micro/Nanomaterials into Complex, Three-Dimensional Architectures by Compressive Buckling**

Yonggang Huang, *Northwestern University*

**472: Chemo-Poro Elastic Fracture Mechanics of Wellbore Cement Liners: The Role of Eigenstress and Pore Pressure on the Risk of Fracture**

Thomas Petersen, *Massachusetts Institute of Technology*; Franz-Josef Ulm, *Massachusetts Institute of Technology*

**519: A Two-Way Linked Multiscale Model to Analyse and Predict Pavement Damage Performance**

Taesun You, *University of Nebraska*; Yong-Rak Kim, *University of Nebraska*

**630: Polygonal Finite Elements for Finite Elasticity**

Heng Chi, *Georgia Institute of Technology*; Cameron Talischi, *University of Illinois at Urbana-Champaign*; Oscar Lopez-Pamies, *University of Illinois at Urbana-Champaign*; Glaucio Paulino, *Georgia Institute of Technology*

**670: Homogenization of Inter-Granular Fracture Towards a Transient Gradient Damage Model**

Leong Hien Poh, *National University of Singapore*; Gang Sun, *National University of Singapore*

**728: Modeling Dynamic Fragmentation of Heterogeneous Structural Materials**

David Cereceda, *Johns Hopkins University*; Nitin Daphalapurkar, *Johns Hopkins University*; Lori Graham-Brady, *Johns Hopkins University*

**770: A Comparison of Two Damage-Plasticity Formulations for Concrete Like Materials**

Reza Mousavi, *University of Houston*; Masoud Dehghani Champiri, *University of Houston*; Kaspar J. Willam, *University of Houston*

M-1-2 - EMI-MS-11/12: Multiscale Mechanics of Bio-Inspired and Biological Materials and Structures

9:45 AM – 11:30 AM

**607: A Multiscale Micromechanical Model for Soft Collageneous Tissues**

Claire Morin, *Mines Saint-Etienne*; Stéphane Avril, *Mines Saint-Etienne*; Christian Hellmich, *Vienna University of Technology*

**738: Osteocyte Calcium Response to Mechanical Load Quantified in Live Allograft Biological Systems at Successive Differentiation Stages**

Elisa Budyn, *University of Illinois at Chicago*; Morad Bensidhoum, *Department of Biology B20A Laboratory*; Samantha Sanders, *Department of Mechanical Engineering, LMT Laboratory*; Patrick Tauc, *Department of Biology, LBPA Laboratory*; Eric Schmidt, *University of Illinois at Chicago*; Nicolas Roubier, *Department of Mechanical Engineering, MSSMat Laboratory*; Denis Aubry,

*Department of Biology, LBPA Laboratory; Eric Deprez, Department of Biology, LBPA Laboratory; Herve Petite, Department of Biology, B2OA Laboratory*

**195: Cell Response to Static and Cyclic Compression in a Three-Dimensional Matrix**

*Lijie Yang, Vanderbilt University; Léolène Jean Carrington, Vanderbilt University; Long Wang, Vanderbilt University; Jessica Jackson Abner, Vanderbilt University; Mingfang Ao, Vanderbilt University; Nabil Simaan, Vanderbilt University; Donna Webb, Vanderbilt University; Deyu Li, Vanderbilt University*

**225: A Proposal for a Cell-Based Bone's "Mechanostat" Theory: The Need to Account for the Desensitisation and Replacement of the Mechanosensing Cells**

*Chloe Lerebours, Monash University; Pascal Buenzli, Monash University*

**278: Experimental and Numerical Development of Material Constitutive Properties for Marine Mammals**

*Molly Grear, University of Washington; Michael Motley, University of Washington*

**608: Micromechanical Stiffness Estimation of Tissue Engineering Scaffolds Composed of Hydroxyapatite Granules, Considering Bone Regeneration**

*Stefan Scheiner, Vienna University of Technology; Vladimir Komlev, Russian Academy of Sciences; Alexey Gurin, Central Scientific Research Institute of Dentistry and Maxillofacial Surgery; Christian Hellmich, Vienna University of Technology*

**643: Bioinspired Infrastructure Materials: The Interaction Between Peptides and Calcium-Silicate-Hydrate**

*Mahsa Kamali, University of Miami; Ali Ghahremaninezhad, University of Miami*

M-1-3 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics

9:45 AM – 11:30AM

**468: Mini-Symposium Keynote: Variational Coupling of DG and CG Methods for Local Damage in Multi-Constituent Materials Modeled via Mixture Theory**

Arif Masud, *University of Illinois*; Harishanker Gajendran, *University of Illinois*; Pinlei Chen, *University of Illinois*

**70: Computationally Efficient Modeling of Axially Reinforced, Inflatable, Braided Beams and Tori**

Andrew Young, *University of Maine*; William Davids, *University of Maine*; Andrew Goupee, *University of Maine*; Joshua Clapp, *University of Maine*

**97: A Computational-Experimental Framework To Estimate Transport Properties Of Multi-Phase Composites**

Masoud K. Darabi, *University of Kansas*; Eisa Rahmani, *Texas A&M University*; Dallas Little, *Texas A&M University*; Eyad Masad, *Texas A&M University at Qatar*

**120: An Atomistic-to-Continuum Approach to Modeling Size Effects in Polymer-Carbon Nanotube Composites**

Marcello Malagu', *Delft University of Technology and University of Ferrara*; Alexey Lyulin, *Eindhoven University of Technology*; Elena Benvenuti, *University of Ferrara*; Angelo Simone, *Delft University of Technology*

**740: A Multiscale GFEM for Fiber Reinforced Composites**

Phillipe Alves, *University of Illinois at Urbana-Champaign*; C. Armando Duarte, *University of Illinois at Urbana-Champaign*

**336: An Interfacial Model for Mode-I and Mode-II Dynamic Crack Propagation in Rocks with Stick-Slip Contact Transitions**

Reza Abedi, *University of Tennessee Space Institute*; Omid Omid, *University of Tennessee Space Institute*; Robert Haber, *University of Illinois at Urbana-Champaign*; Ahmed Elbanna, *University of Illinois at Urbana-Champaign*

M-1-4 - EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling

9:45 AM – 11:30 AM

**757: Mini-Symposium Keynote: Micromorphic Model Including Grain Spins Based Upon Granular Micromechanics**

Anil Misra, *University of Kansas*; Payam Poorsolhjouy, *University of Kansas*

**61: Micromechanics of Incremental Stress Probes of a Granular Material**

Matthew R. Kuhn, *University of Portland*

**115: Improvement of Contact Force Model and Failure Criterion of Bonded Dilated Polyhedral Elements**

Lu Liu, *Dalian University of Technology*; Shanshan Sun, *Dalian University of Technology*; Shunying Ji, *Dalian University of Technology*

**428: Effect of Particle Shape and Particle Size Ratio on the Packing Density of Very Dense Binary Mixtures**

Tang-Tat Ng, *University of New Mexico*

**467: Micro-Macro Experimental Study of Remoulded Clayey Materials on Drying Path**

Xin Wei, *ENS Cachan*; Jean-Marie Fleureau, *ECP MSSMAT CNRS8579*; Mahdia Hattab, *Université de Lorraine- LEM3 CNRS7239*

**736: The Application of Non-smooth Contact Dynamics in Particle Mechanics**

Liuchi Li, *California Institute of Technology*

M-1-5 - EMI-MS-23: Pavement Mechanics and Materials

9:45 AM – 11:30 AM

**98: Rutting Performance Prediction and Analysis of Airfield Pavements Subjected to Next Generation Aircraft**

Masoud K. Darabi, *University of Kansas*; John Rushing, *U.S. Army Engineer Research and Development Center, CEERD-GM-A*; Eisa Rahmani, *Texas A&M University*, Rashmi Kola, *University of Kansas*; Dallas Little, *Texas A&M University*

**331: Property Analysis of Exfoliated Graphite Nanoplatelets Modified Asphalt Model Using Molecular Dynamics (MD) Method**

Hui Yao, *Michigan Technological University*; Qingli Dai, *Michigan Technological University*; Zhanping You, *Michigan Technological University*

**375: Numerical and Experimental Analysis of Geogrid Reinforced Concrete Overlays**

George Saad, *American University of Beirut*; Hayssam Itani, *American University of Beirut*; Ghassan Chehab, *American University of Beirut*

**474: A Numerical-Experimental Approach to Characterize Fracture Properties of Fine Aggregate Asphalt Mixtures at Different Temperatures and Loading Rates**

Francisco Aragao, *Federal University of Rio de Janeiro – COPPE*, Diego Hartmann, *Federal University of Rio de Janeiro – COPPE*, Gustavo Badilla-Vargas, *Federal University of Rio de Janeiro – COPPE*, Yong Rak Kim, *University of Nebraska*

**550: Viscoelastic Characterization of Bituminous Materials through Multiscale Testing-Analysis**

Hesamaddin Nabizadeh, *University of Nebraska-Lincoln*; Santosh Kommidi, *University of Nebraska-Lincoln*, Yong-Rak Kim, *University of Nebraska-Lincoln*

**564: Computational Evaluation of the Role of Aggregate Shape Parameters on the Mechanical Performance and Degradation of Asphalt Mixtures**

Daniel Castillo, *Universidad de los Andes*; Silvia Caro, *Universidad de los Andes*; Masoud Darabi, *University of Kansas*; Eyad Masad, *Texas A&M University at Qatar*

**566: Semicircular Bend Fracture Test Integrated with Numerical Simulation to Characterize Mixed-Mode Fracture Properties of Asphaltic Materials**

Soohyok Im, *Texas A&M Transportation Institute*; Hoki Ban, *Kangwon National University*;  
Yong-Rak Kim, *University of Nebraska-Lincoln*

M-1-6 – EMI-MS-32: Topology Optimization; Algorithms and Applications

9:45 AM – 11:30 AM

**129: Mini-Symposium Keynote: Design Optimization of 3-D Woven Micro-Lattice Materials**

Seunghyun Ha, *Korea Maritime & Ocean University*; James Guest, *Johns Hopkins University*

**89: A Lower-Bound Formulation Including Spatial Orientation for Topology Optimization of Modular Truss Structures**

Alexis Tugilimana, *Université libre de Bruxelles*; Ashley Thrall, *University of Notre Dame*; Benoît Descamps, *Université libre de Bruxelles*; Rajan Filomeno Coelho, *Université libre de Bruxelles*

**133: Topology Optimization of Structures Considering Constructability Costs**

Saranthip Koh, *Johns Hopkins University*; James K. Guest, *Johns Hopkins University*

**540: A Maximum Filter for the Ground-Structure Method**

Emily Daniels, *Georgia Institute of Technology*; Adeildo Ramos Jr., *Federal University of Alagoas*;  
Glaucio Paulino, *Georgia Institute of Technology*

**635: A Discrete Filter Scheme for Topology Design with Material Nonlinear Behaviors Using the Ground Structure Method**

Xiaoja Zhang, *Georgia Institute of Technology*; Adeildo Ramos Jr., *Federal University of Alagoas*;  
Glaucio Paulino, *Georgia Institute of Technology*

**778: Conceptual Building Design: Density and Ground Structure Topology Optimization Solutions**

Igor Torres; Sara Brandão; Sylvia Almeida; Glaucio Paulino, *Georgia Institute of Technology*



M-1-7 – EMI-MS-33: Cyber Physical Infrastructure

9:45 AM – 11:30 AM

**504: Utility Mapping and Subsurface Structural Assessment with Tri-Band Ground Penetrating Radar**

Dryver Huston, *University of Vermont*; Tian Xia, *University of Vermont*; Yu Zhang, *University of Vermont*; Taian Fan, *University of Vermont*

**553: Application of the Trajectory Cluster Analysis for Road Surface Monitoring**

Jinwoo Jang, *Columbia University*; Andrew Smyth, *Columbia University*

**416: Structure-Invariant Occupant Detection Using Footstep-Induced Structural Vibration**

Mostafa Mirshekari, *Carnegie Mellon University*; Mike Lam, *Carnegie Mellon University*; Pei Zhang, *Carnegie Mellon University*; Hae Young Noh, *Carnegie Mellon University*

**631: Estimator and Closed-Loop Performance of Wireless Control Systems under Intermittent Observations**

Lauren Linderman, *University of Minnesota*

**411: 20 Year Old Real-Time Sensor and Management Systems**

Chung Song, *University of Nebraska-Lincoln*; Dong D. Yoon, *GS Construction*

**462: Multiscale Monitoring and Health Assessment of Levees**

Mourad Zeghal, *Rensselaer Polytechnic Institute*; Abdoun Tarek, *Rensselaer Polytechnic Institute*; Victoria Bennett, *Rensselaer Polytechnic Institute*

M-1-8 – EMI-MS-37: Computational Modeling in Civil Engineering

9:45 AM – 11:30 AM

**768: Mini-Symposium Keynote: Numerical Evaluation of Forces on Piled Bridge Foundations in Laterally Spreading Soil**

Alborz Ghofrani; Chris McGann; Pedro Arduino, *University of Washington*

**633: Seismic Soil-Structure Interaction Analysis of Nuclear Power Plants: Time Domain versus Frequency Domain**

Payman Khalili-Tehrani, *SC Solutions, Inc.*; Benjamin Kosbab, *SC Solutions, Inc.*

**189: Effect of Soil Heterogeneity on Nuclear Facility Soil-Foundation Interaction**

Swetha Veeraraghavan, *Idaho National Laboratory*; Justin Coleman, *Idaho National Laboratory*; Benjamin Spencer, *Idaho National Laboratory*

**446: Modeling Kinematic and Inertial Interaction Effects on Buried Structures through Reduced Order Models**

Elnaz Esmaeilzadeh Seylabi, *University of California, Los Angeles*; Ertugrul Taciroglu, *University of California, Los Angeles*

**326: Dynamic Interaction of Soil – Structure Cluster**

Feng Xiong, *Sichuan University*; Qi Ge, *Sichuan University*

**152: Analytical Studies of a Test Model for Soil-Abutment Interaction under Seismic Loads**

Bahareh Abdollahi, *University of Nevada, Reno*; M. Saiid Saiidi, *University of Nevada, Reno*; Raj V. Siddharthan, *University of Nevada, Reno*; Sherif Elfass, *University of Nevada Reno*; Anoosh Shamsabadi, *California Department of Transportation, Sacramento*

M-1-9 – PMC-MS-01: Advanced Simulation-Based Approaches to Uncertainty Quantification and Reliability Analysis

9:45 AM – 11:30 AM

**759: Mini-Symposium Keynote: Mechanical Systems' Reliability by Enhanced Monte Carlo Simulation**

Arvid Naess, *Norwegian University of Science & Technology*; H. Svandal Bø, *Capgemini Norge AS*

**184: Reliability Evaluation of Large Nonlinear Structures Excited by Dynamic Loadings  
Applied in Time Domain**

Hamoon Azizsoltani, *University of Arizona*; Novonil Sen, *University of Arizona*; Achintya Haldar, *University of Arizona*

**300: Reliability Analysis of Structures Subject to Spatio-Temporal Loading**

Harshini Devathi, *Vanderbilt University*; Zhen Hu, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

**244: Reliability Assessment with Efficient Sequential Importance Sampling**

Iason Papaioannou, *TU München*; Costas Papadimitriou, *University of Thessaly*; Daniel Straub, *TU München*

**706: First Order Sampling Approach for Time-Dependent System Reliability Analysis**

Zhen Hu, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

M-1-10 - PMC-MS-03: Uncertainty Modeling & Propagation Techniques in Stochastic Dynamics

9:45 AM – 11:30 AM

**498: Power Spectral Density Response through Modal Analysis Framed into Analytical Dynamics**

Vasileios Fragkoulis, *University of Liverpool*; Ioannis Kougioumtzoglou, *Columbia University*; Athanasios Pantelous, *University of Liverpool*; Antonina Pirrotta, *University of Liverpool and University of Palermo*

**170: Efficient Incremental Dynamic Analysis via Stochastic Averaging**

Ketson dos Santos, *Columbia University*; Ioannis Kougioumtzoglou, *Columbia University*; André Beck, *University of São Paulo*

**507: Temporal Coherence in Turbulent Wind Fields: Modeling and Simulation**

Jennifer Rinker, *Duke University*; Henri Gavin, *Duke University*

**118: A Semi-Analytical Methodology for the Reliability-Based Design of Linear Dampers used for Seismic Hazard Mitigation of Buildings**

Michele Barbato, *Louisiana State University*; Enrico Tubaldi, *University of Camerino*; Andrea Dall'Asta, *University of Camerino*

**113: Uncertain Seismic Wave Propagation through Uncertain Elastic-Plastic Soils**

Fangbo Wang, *University at Buffalo*; Kallol Sett, *University at Buffalo*

M-1-11 - PMC-MS-07: Uncertainty Quantification and Model Verification and Validation in Multiscale Simulation

9:45 AM – 11:30 AM

**180: Adaptive Selection and Validation of Coarse-Grained Models of Atomistic Systems in the Presence of Uncertainties**

Kathryn Farrell-Maupin, *University of Texas at Austin*; J. Tinsley Oden, *ICES, University of Texas at Austin*; Danial Faghihi, *University of Texas at Austin*

**191: Uncertainty Quantification of Manufacturing Process Effects on Macro-scale Material Properties**

Guowei Cai, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

**130: Sensitivity Assessment of Interatomic Potentials On-the-fly in Molecular Dynamics Simulation**

Anh Tran, *Georgia Institute of Technology*; Yan Wang, *Georgia Institute of Technology*

**143: Uncertainty Quantification and Model Verification for Nanoindentation Simulations: a Combined MD and Hybrid MD/FEM Study**

Francesca Tavazza, *National Institute of Standards and Technology*; Li Ma, *National Institute of Standards and Technology*; Dilip Banerjee, *National Institute of Standards and Technology*; Lyle Levine, *National Institute of Standards and Technology*

**88: Uncertainty Quantification and Model Verification and Validation in Multiscale Simulation**

Paul Braden, *U.S. Air Force*

M-1-12 – PMC-MS-10: Community Resilience in China

9:45 AM – 11:30 AM

**209: Numerical Investigation for Bridge Seismic Performance Correlation**

Jianjun Qin, *Tongji University*; Yao Liu, *Tongji University*

**36: Earthquake-Induced Falling Debris Hazard Analysis and Emergency Shelter Design of High-Density Tall Building Areas: A Case Study of Beijing Central Business District (CBD)**

Zhebiao Yang, *Tsinghua University*; Chen Xiong, *Tsinghua University*; Zhen Xu, *University of Science and Technology Beijing*; Xinzheng Lu, *Tsinghua University*

**709: Seismic Resilience Assessment of RC Highway Continuous Bridges in China**

Dagang Lu, *Harbin Institute of Technology*; Sheng Xu, *Harbin Institute of Technology*; Jelena M. Andrić, *Harbin Institute of Technology*

**561: Resilience and Quantifying Assessment on Earthquake-Damaged Circular Bridge Columns Repaired Using Combination of Near-Surface-Mounted BFRP Bars with External BFRP Sheets Jacketing**

Shao-Fei Jiang, *Fuzhou University*; Xing-Gui Zeng, *Fuzhou University*; Kun Deng, *Fuzhou University*

**535: Seismic Performance Comparison of Multistory Steel Frame with Self-Centering Energy Dissipative Bracings and Buckling Restrained Bracings under Near-Fault Ground Motion**

Jianping Han, *Lanzhou University of Technology*; Zixiang Guan, *Lanzhou University of Technology*

**399: Resilience of Lifeline Infrastructures**

Jianjun Qin, *Tongji University*; Jie Li, *Tongji University*

**451: Research on Frequency-Temperature Correlation of Runyang Suspension Bridge during Typhoon Matsa Using Structural Health Monitoring and Finite Element Analysis**

Hao Wang, *Southeast University*; Jianxiao Mao, *Southeast University*; Zhixiang Xun, *Southeast University*

M-1-13 - PMC-MS-15: Surrogate Models for Uncertainty Quantification, Reliability/Risk Assessment and Robust Design

9:45 AM – 11:30 AM

**93: Limit-State Surrogate Based Reliability Estimation under Uncertainty**

Saideep Nannapaneni, *Vanderbilt University*; Zhen Hu, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

**126: LARS-Based ARX PCE Metamodel for Computing Seismic Fragility Curves**

Chu Mai, *ETH Zurich*; Minas Spiridonakos, *ETH Zurich*; Eleni Chatzi, *ETH Zurich*; Bruno Sudret, *ETH Zurich*

**168: Adaptive Surrogate Model-Based Stochastic Search Algorithms for Locating Implicitly Defined Limit Surfaces for Structural Reliability Analysis**

Sundar V.S., *Johns Hopkins University*; Michael Shields, *Johns Hopkins University*

**8: Adaptive Kriging Metamodeling for Simultaneous Uncertainty-Propagation and Design-Optimization**

Jize Zhang, *University of Notre Dame*; Alexandros Taflanidis, *University of Notre Dame*

**690: Reliability Assessment of Power Distribution Lines Against Wind Loadings Using an Adaptive Kriging Method**

Yousef Mohammadi Darestani, *The Ohio State University*; Abdollah Shafieezadeh, *The Ohio State University*

**172: Reliability Analysis of Steel Frames under Earthquake Loading Using Meta-Models**

Mehdi Rostamian, *University of Memphis*; Adel Abdelnaby, *University of Memphis*

Parallel Session 2 – 2:15 PM – 3:45 PM

M-2-1 – PMC-MS-04: Structural Identification and Damage Detection

2:15 PM – 3:45 PM

**267: Mini-Symposium Keynote: Bayesian Methods for Nonlinear Finite Element Model Updating and Damage Identification of Civil Structures**

Rodrigo Astroza, *University of California, San Diego/ Universidad de los Andes*; Hamed Ebrahimian, *University of California, San Diego*; Joel P. Conte, *University of California, San Diego*

**90: Sensor Placement for Structural Health Monitoring: An Optimal Bayesian Experimental Design Approach**

Giovanni Capellari, *Politecnico di Milano*; Eleni Chatzi, *ETH Zürich*; Stefano Mariani, *Politecnico di Milano*

**585: Model Updating of a 10-Story Concrete Building Using Hierarchical Bayesian Framework**

Iman Behmanesh, *WSP | Parsons Brinckerhoff*; Seyedsina Yousefianmoghadam, *University at Buffalo*; Amin Nozari, *Tufts University*; Babak Moaveni, *Tufts University*; Andreas Stavridis, *University at Buffalo*

**697: Exploration of Error Rate Criteria to Decide Bounds for Model Falsification**

Subhayan De, *University of Southern California*; Patrick Brewick, *University of Southern California*; Erik Johnson, *University of Southern California*; Steve Wojtkiewicz, *Clarkson University*

**288: Dynamic Characterization of Civil Structures Based on the Variational Mode Decomposition Method**

Abdollah Bagheri, *University of Virginia*; Osman Ozbulut, *University of Virginia*; Devin Harris, *University of Virginia*

**328: Strategies to Tackle the Dimensionality Issue for Nonlinear Bayesian Filtering and Parameter Identification**

Audrey Olivier, *Columbia University*; Andrew Smyth, *Columbia University*

M-2-2 – EMI-MS-04: Multiscale Behavior of Damage and Failure Mechanics

2:15 PM – 3:45PM

**393: Mechanics of Damage, Healing, Damageability, and Integrity of Materials: A Conceptual Framework**

George Voyiadjis, *Louisiana State University*; Peter Kattan, *Louisiana State University*

**81: Multi-Scale Modeling of Damage and Failure in S-Glass/Epoxy Fiber Reinforced Composite Subject to High Strain Rate Impact**

Zhiye Li, *Johns Hopkins University*; Shinu Baby, *Johns Hopkins University*; Xiaofan Zhang, *Johns Hopkins University*; Somnath Ghosh, *Johns Hopkins University*

**323: Micromechanical Damage Model for Mode I Fracture of Fiber Composite under Static Loading**

Rudraprasad Bhattacharyya, *Vanderbilt University*; Caglar Oskay, *Vanderbilt University*

**508: Interaction of Failure Modes in the Fatigue Life of Laminated Composites**

Michael Bogdanor, *Vanderbilt University*; Caglar Oskay, *Vanderbilt University*

**775: A Mixed-Mode Rate-Dependent Cohesive Zone Model Using Fractional Viscoelasticity**

Oliver Giraldo-Londoño, *University of Illinois*; Glaucio Paulino, *Georgia Institute of Technology*; William Buttlar, *University of Illinois*



**359: Interfacial Debonding and Viscoelastic Behavior of Magnetorheological Nanocomposites**

Robbie Damiani, *University of California, Irvine*; Lizhi Sun, *University of California, Irvine*

M-2-3 – EMI-MS-05: Second Symposium on Molecular Scale Modeling and Experimentation 2:15 PM – 3:45PM
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**617: Multiscale Modeling of Scaffolds for Bone Regeneration: Bridging Molecular to Macroscale**

Dinesh Katti, *North Dakota State University*; Anurag Sharma, *North Dakota State University*;  
Kalpana Katti, *North Dakota State University*

**625: Evaluation of Coarse Grained Models for Cellulose NanoCrystals (CNCs)**

Mehdi Shishehbor, *Purdue University*; Pablo Zavattieri, *Purdue University*

**645: Molecular Dynamics Simulation of the Melting of Pore Eater for Understanding Phase Composition Behavior of Frozen Soils in the Extremely Low Temperature Range**

Chao Zhang, *Michigan Technological University*; Zhen Liu, *Michigan Technological University*;  
Peng Deng, *Colorado School of Mines*; Shiling Pei, *Colorado School of Mines*

**727: Sensitivity of Thermal Conductivity to Force Estimates in Molecular Dynamics Simulations**

Greg Walker, *Vanderbilt University*; CN Brock, *Vanderbilt University*; MD Gerboth, *Vanderbilt University*

**744: Ergodicity and Linear Response of Thermostats for Single Degree of Freedom Systems: Towards Improved Temperature Control**

Puneet Patra, *Indian Institute of Technology Kharagpur*; Baidurya Bhattacharya, *Indian Institute of Technology Kharagpur*

M-2-4 – EMI-MS-08: Modeling Time-Dependent Behavior and Deterioration of Concrete
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**454: A Discrete Hygro-Thermal-Chemo-Mechanical Model for Deterioration of Concrete Structures**

Giovanni Di Luzio, *Politecnico di Milano (University)*; Gianluca Cusatis, *Northwestern University*; Xinwei Zhou, *Engineering and Software System Solutions, Inc.(ES3)*; Daniele Pelessone, *cEngineering and Software System Solutions, Inc.(ES3)*

**629: Modeling of Aging Effects on Concrete Creep/ Shrinkage Behavior: A Lattice Discrete Particle Modeling Approach**

Mohammed Abdelatif, *Rensselaer Polytechnic Institute*; Giannis Boumakis, *University of Natural Resources and Life Sciences Vienna*; Roman Wendner, *University of Natural Resources and Life Sciences Vienna*; Mohammed Alnaggar, *Rensselaer Polytechnic Institute*

**546: Constitutive Models for Mortar of Bonded Anchors**

Marco Marcon, *University of Natural Resources and Life Sciences Vienna*; Jan Vorel, *University of Natural Resources and Life Sciences Vienna*; Roman Wendner, *University of Natural Resources and Life Sciences Vienna*

**543: Long-Term Deformations of Fastening Systems under Sustained Loads**

Roman Wendner, *University of Natural Resources and Life Sciences Vienna*; Marco Marcon, *University of Natural Resources and Life Sciences Vienna*; Giannis Boumakis, *University of Natural Resources and Life Sciences Vienna*

**598: Coupled Thermo-Mechanical Behavior of Hydronically-Activated Concrete Structures: Consideration of Material Damage Due to Mechanical Loading and Temperature Cycling**

Zhenglai Shen, *The University of Alabama in Huntsville*; Hongyu Zhou, *The University of Alabama in Huntsville*; Qiuhai Zuo, *The University of Alabama in Huntsville*

**716: Freezing/Thawing Rate Effects on Concrete Strength with Different Moisture Contents**

Christina Sanon, *Rensselaer Polytechnic Institute*; Mohammed Abdelatif, *Rensselaer Polytechnic Institute*; Elsayed Salem, *Rensselaer Polytechnic Institute*; Giovanni Di Luzio, *Polytechnico di Milano*; Mohammed Alnaggar, *Rensselaer Polytechnic Institute*

M-2-5 –EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics 2:15 PM – 3:45 PM
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**72: Multi-Physics Simulation for a Strain Rosette Made of Slotted Patch Antenna Sensors**  
Dan Li, *Georgia Institute of Technology*; Chunhee Cho, *Georgia Institute of Technology*; Yang Wang, *Georgia Institute of Technology*

**74: Reduced Order Variational Multiscale Enrichment Method for Thermo-Mechanical Problems**  
Shuhai Zhang, *Vanderbilt University*; Caglar Oskay, *Vanderbilt University*

**101: Multi-Time Scale Coupled Transient Electro-Magnetic and Structural Dynamics Finite Element Analysis for Antenna Simulations**  
Reza Yaghmaie, *Johns Hopkins University*; Shu Guo, *Johns Hopkins University*; Somnath Ghosh, *Johns Hopkins University*

**352: A Domain Decomposition Based Preconditioner for the Solution of Shear Bands**  
Luc Berger-Vergiat, *Columbia University*; Haim Waisman, *Columbia University*

**660: Degradation of Materials and Structures Due to Temperature and Moisture: Semi-Analytical Solutions, Computational Framework, and Numerical Solutions**  
Can Xu, *University of Houston*; Kalyana Nakshatralla, *University of Houston*

**691: A Distributed Electro-Conductive Finite Element Method Devoted for Energy-Harvesting and Self-Monitoring Applications on Plate-Like Reinforced Structures**

Antonio Velazquez, *Ohio University*; Munir D. Nazzal, *Ohio University*; Hajir A. Ali, *Ohio University*

M-2-6 – EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling

2:15 PM – 3:45PM

**38: Understanding the Effect of Modeling Fidelity of Particle Shapes on Simulation Fidelity of Soil Behavior through 3D Printing**

Yu-Feng Su, *Florida International University*; Bin Zhang, *Florida International University*; Seung Jae Lee, *Florida International University*, Beena Sukumaran, *Rowan University*

**198: Advances in Dynamical Simulation and Analysis of Granular Flows**

Denis Blackmore, *New Jersey Institute of Technology*; Anthony Rosato, *New Jersey Institute of Technology*

**217: Onset of Grain Size Segregation in Bi-Disperse Chute Flow**

Lu Jing, *The University of Hong Kong*; Fiona Kwok, *The University of Hong Kong*; Andy Leung, *The Hong Kong Polytechnic University*

**256: Floor Pressures below Dry and Submerged Layered Vertical Granular Columns**

Otis Walton, *Lawrence Livermore National Laboratory & Grainflow Dynamics Inc.*; Hubert Vollmer, *Lawrence Livermore National Laboratory*; Victor Hepa, *Lawrence Livermore National Laboratory*

**465: Fabric Evolution during Soil Liquefaction**

Usama El Shamy, *Southern Methodist University*; Yasser Abdelhamid, *Southern Methodist University*

M-2-7 – EMI-MS-24: Advanced Analysis for Earthquake Engineering

2:15 PM – 3:45PM

**310: Structural Response Analysis Using a Novel Predictive Stochastic Ground Motion Model**

Christos Vlachos, *Columbia University*; Konstantinos G. Papakonstantinou, *Pennsylvania State University*; George Deodatis, *Columbia University*

**634: An Enhanced Stochastic Averaging Method for Optimal Control of Structures with Nonlinear Soil-Structure Interactions**

Omar El-Khoury, *The Ohio State University*; Abdollah Shafieezadeh, *The Ohio State University*

**685: Effects of Foundation Gapping and Sliding on Seismic Risk of Nuclear Structures**

Chandrakanth Bolisetti, *Idaho National Laboratory*; Justin Coleman, *Idaho National Laboratory*

**597: Using Sobol Decomposition in Sensitivity Analysis of Nonlinear Dynamic Behavior of RC Buildings with Viscous Damper**

Mohammadreza Moradi, *Old Dominion University*; Alireza Moradi, *Tehran Azad University*

**699: Optimal Clipped Linear Strategies for Controllable Damping**

Qian Monica Fang, *University of Southern California*; Patrick Brewick, *University of Southern California*; Erik Johnson, *University of Southern California*; Steve Wojtkiewicz, *Clarkson University*

**689: Multi-Agent Decentralized Vibration Control of Large Building Structures Using Bio-Inspired Replicator Dynamics**

Mariantonieta Gutierrez Soto, *The Ohio State University*; Hojjat Adeli, *The Ohio State University*

M-2-8 – EMI-MS-25: Advances in Base Isolation
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2:15 PM – 3:45PM
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**602: A Mechanistic Macro-Model for Lead-Rubber Seismic Isolation Bearings**

Gordon Warn, *Penn State University*

**548: Coupling Behavior of Shear Deformation and End Rotation of Elastomeric Seismic Isolation Bearings**

Ken Ishii, *Hokkaido University*; Masaru Kikuchi, *Hokkaido University*; Takuya Nishimura, *Shimizu Corporation*; Ian Aiken, *SIE*

**196: Multiple Floor Isolation Control System for Integrating Mass Damper and Seismic-Isolation Systems in Buildings**

Hamidreza Anajafi Marzijarani, *University of New Hampshire*; Tat S. Fu, *University of New Hampshire*

**464: Analysis of the Rocking Response of Unrestrained Equipment on Rolling Isolation Systems**

P Scott Harvey Jr, *University of Oklahoma*; Skylar J Calhoun, *University of Oklahoma*

**490: Gauss's Principle of Least Constraint and Nonholonomic Dynamics**

Karah Kelly, *Duke University*; Henri Gavin, *Duke University*

**497: Inelastic Base Shear Reconstruction from Sparse Acceleration Measurements of Buildings**

Boya Yin, *Duke University*; Henri Gavin, *Duke University*

M-2-9 – EMI-MS-30: Computational Methods and Applications for Fluid-Structure Interactions

2:15 PM – 3:45PM

**739: Fluid-Structure Interaction Using the Domain Free Discretization (DFD) Method**

Yang Zhang, *Vanderbilt University*; Haoxiang Luo, *Vanderbilt University*; Chunhua Zhou, *Nanjing University of Aeronautics and Astronautics*

**32: Three-Dimensional DEM-CFD Coupled Modeling of Gas-Particles Interaction in Supersonic Compressible Flows and Buried Landmine Blast Wave**

Beichuan Yan, *University of Colorado at Boulder*; Richard Regueiro, *University of Colorado at Boulder*

**175: Community-Scale Multi-Fidelity Modeling of Tsunami Forces on Coastal Structures**

Xinsheng Qin, *University of Washington*; Michael Motley, *University of Washington*; Randall LeVeque, *University of Washington*; Frank Gonzalez, *University of Washington*

**663: Field and Laboratory Testing of Levee Structures in Southwest Louisiana to Mitigate Storm Surges and Protect the Shoreline**

Dimitrios Dermisis, *McNeese State University*; Evan Geerts, *Duplantis Design Group, PC*; Ning Zhang, *McNeese State University*

**426: Investigation of the Impacts of Coastal Waves on Erosion of Coastal Structures**

Ning Zhang, *McNeese State University*

**704: A 2D Fluid-Structure Interaction Method for Modeling the Performance of Resetting Semi-Passive Stiffness Dampers (RSPSD)**

Antonio Velazquez, *Ohio University*; Ken Walsh, *Ohio University*

M-2-10 – EMI-MS-34: Infrastructure System Integrity through Next-Generation Automated Sensing, Damage Diagnosis and Prognosis 2:15 PM – 3:45PM
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**714: Consequence-Based Management of Railroad Bridges Networks Enabled by Wireless Smart Sensors**

Fernando Moreu, *University of New Mexico*; Billie Spencer, *University of Illinois at Urbana-Champaign*; Douglas Foutch, *Professor Emeritus*; Sandro Scola, *Canadian National Railway*

**679: Computational and Experimental Testing of Thermo-Chemical Structural Health Monitoring of Composites**

Behnoush Golchinfar, *Stevens Institute of Technology*; Marcus Rutner, *Stevens Institute of Technology*; Dimitri Donskoy, *Stevens Institute of Technology*

**112: AE Based Damage Detection of Steel Bridge Superstructures**

Ozgur Yapar, *Dassault Systèmes Simulia Corp*; Prodyot K. Basu, *Vanderbilt University*

**683: Large Coverage, Direct Sensing and Monitoring of Corrosion in Reinforced Concrete Structures**

Marcus Rutner, *Stevens Institute of Technology*; Dimitri Donskoy, *Stevens Institute of Technology*

M-2-11 – PMC-MS-01: Advanced Simulation-Based Approaches to Uncertainty Quantification and Reliability Analysis 2:15 PM – 3:45 PM
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**166: Propagation of Uncertain Probability Distributions Using Bayesian Inference and Importance Sampling**

Jiaxin Zhang, *Johns Hopkins University*; Michael Shields, *Johns Hopkins University*

**239: A Parallel MCMC Method**

Laura Swiler, *Sandia National Laboratories*; Jaideep Ray, *Sandia National Laboratories*; Maoyi Huang, *Pacific Northwest National Laboratory*; Jason Hou, *Pacific Northwest National Laboratory*

**334: A New Sample-Based Method to Estimate Global Sensitivity Indices**

Chenzhao Li, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

**437: Optimal Approximation of Multi-Variate Stochastic Processes by Functional Quantization**

Vasileios Christou, *Lehigh University*; Paolo Bocchini, *Lehigh University*; Manuel Miranda, *Hofstra University*



**440: Design of Experiments for Uncertainty Quantification on Sparsely Sampled Discrete Random Functions in Multiple Dimensions**

Justin Winokur, *Sandia National Laboratories*; Vicente Romero, *Sandia National Laboratories*

M-2-12 – PMC-MS-03: Uncertainty Modeling & Propagation Techniques in Stochastic Dynamics

2:15 PM – 3:45 PM

**176: Nonlinear System with Fractional Derivative Terms Parameter Identification Subject to Incomplete Non-Stationary Data**

Ioannis Kougiumtzoglou, *Columbia University*; Ketson dos Santos, *Columbia University*; Liam Comerford, *University of Liverpool*

**285: Random Vibration Integrals for Systems Endowed with Fractional Derivative Elements**

Pol Spanos, *Rice University*; Vasileios Fragkoulis, *University of Liverpool*; Ioannis Kougiumtzoglou, *Columbia University*; Athanasios Pantelous, *University of Liverpool*

**463: Anomalous Stochastic Resonance Modeled by Fractional Fokker-Planck Equation**

Yan Wang, *Georgia Institute of Technology*

**384: Variability Response Functions for Apparent Material Properties in Two-Dimensional Elasticity Problems**

Jenny Sideri, *Columbia University*; Athina Spyridaki, *Columbia University*; George Deodatis, *Columbia University*; Sanjay R. Arwade, *University of Massachusetts Amherst*

**385: Variability Response Functions for Statically Determinate Beams with Arbitrary Nonlinear Constitutive Laws**

Athina Spyridaki, *Columbia University*; Jenny Sideri, *Columbia University*; George Deodatis, *Columbia University*; Sanjay Raja Arwade, *University of Massachusetts Amherst*

M-2-13 – PMC-MS-15: Surrogate Models for Uncertainty Quantification, Reliability/Risk Assessment and Robust Design  
2:15 PM – 3:45 PM

**261: Gaussian Process Models for Truncated Response Data**

John McFarland, *Southwest Research Institute*

**237: An Adaptive Method for Solving Stochastic Equations Using Local Taylor Approximations and a Posteriori Error Estimates**

Wayne Isaac Uy, *Cornell University*; Mircea Grigoriu, *Cornell University*

**681: A Gradient Based Adaptive Sparse Grid Collocation Method for Uncertainty Quantification**

Anindya Bhaduri, *Johns Hopkins University*; Lori Graham-Brady, *Johns Hopkins University*

**656: The f-Sensitivity Index**

Sharif Rahman, *The University of Iowa*

**39: Introducing an Algorithm for Training of Neuro-Skin Model**

Mehrdad Shafiei Dizaji, *University of Virginia*; Abdolreza Joghataie, *Sharif University of Technology*

M-2-14 – PMC-MS-16: Bayesian Methods in Uncertainty Quantification and Probabilistic Engineering Design  
2:15 PM – 3:45 PM

**220: Bayesian Reliability Analysis Using OpenBUGS**

Kilian Zwirgmaier, *Technische Universität München*; Daniel Straub, *Technische Universität München*

**307: Reliability Analysis with Linguistic Data: An Evidential Network Approach**

Xiaoge Zhang, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

**317: Sparse Bayesian Learning for Failure Prognostics and Uncertainty Management**

Pingfeng Wang, *Wichita State University*; Parse Kianpour, *Wichita State University*

**669: Full Gibbs Sampling Algorithm for Sparse Damage Detection for the Phase II IASC–ASCE Structural Health Monitoring Experimental Benchmarks**

Yong Huang, *Harbin Institute of Technology*; James Beck, *California Institute of Technology*

**367: Uncertainty Quantification in Manufacturing Process Evaluation**

Saideep Nannapaneni, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*;  
Sudarsan Rachuri, *National Institute of Standards and Technology*

Parallel Session 3 – 4:15 PM – 5:45 PM

M-3-1 — EMI-MS-01: Structural Identification and Damage Detection
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4:15 PM – 5:45 PM
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**221: Advanced System Identification for Super High-rise Building Using Shear-Bending Model**

Kohei Fujita, *Kyoto University*; Ryuji Koyama, *Kyoto University*; Izuru Takewaki, *Kyoto University*

**78: Reconstruction of Acoustic Sources in a Heterogeneous Elastic Solid**

Stephen Lloyd, *The Catholic University of America*; Chanseok Jeong, *The Catholic University of America*

**62: Finite Element Model Updating with Noisy Data through the Modal Dynamic Residual Approach**

Xinjun Dong, *Georgia Institute of Technology*; Yang Wang, *Georgia Institute of Technology*

**516: Modeling the Force-Displacement Behavior of Passive Isolation-Layer Devices in a Four Story, Reinforced Concrete, Base-Isolated Structure through Bouc-Wen Hysteresis**

Patrick Brewick, *University of Southern California*; Erik Johnson, *University of Southern California*; Richard Christenson, *University of Connecticut*

**622: Tracking Longterm Ambient Responses of Bridges Using Multivariate Correlational Data Analysis Based Upon Measurement Data**

Mehdi Norouzi, *University of Cincinnati*; Ehsan Haji Agha, *University of Cincinnati*; Victor Hunt, *University of Cincinnati*; Arthur Helmicki, *University of Cincinnati*

**551: Temperature Effects on Modal Properties of an Updated Full Scale FE Model**

Jinwoo Jang, *Columbia University*; Andrew Smyth, *Columbia University*

M-3-2 — EMI-MS-05: Second Symposium on Molecular Scale Modeling and Experimentation

4:15 PM – 5:45 PM

**338: Atomistic Modeling of Toughening Graphene Through Bio-inspired Topological Design**

Huajian Gao, *Brown University*

**401: Effects of Grain Boundary on the Sources of Size Effects**

George Voyiadjis, *Louisiana State University*; Mohammadreza Yaghoobi, *Louisiana State University*

**488: Designing Better Structural Materials by Understanding Nanoconfinement and Nanoscale Interfaces**

Sinan Keten, *Northwestern University*

**524: Strain Rate Dependent Failure of Interfaces in Glass/Epoxy and Energetic Materials at Nano-Microscale via Dynamic Indentation**

Devendra Verma, *Purdue University*; Vikas Tomar, *Purdue University*

**612: Molecular Characterization and Adhesion Mechanics of Cancer Metastasis on Humanoid Tissue Engineered Scaffolds**

Kalpana Katti, *North Dakota State University*; MD Shahajahan Molla, *North Dakota State University*; Dinesh Katti, *North Dakota State University*

M-3-3 — EMI-MS-08: Modeling Time-Dependent Behavior and Deterioration of Concrete 4:15 PM – 5:45 PM
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**439: Tightly Coupled Multiphysics Simulation of Alkali-Silica Reaction**

Benjamin Spencer, *Idaho National Laboratory*; Hai Huang, *Idaho National Laboratory*

**725: Remaining Potentials of Alkali-silica Reaction of Existing Concrete Structures**

Linfei Li, *University of Colorado at Boulder*; Yunping Xi, *University of Colorado at Boulder*

**544: Bonded Anchors in Concrete Structures Suffering from ASR Damage**

Marco Marcon, *University of Natural Resources and Life Sciences Vienna*; Lauren Stenroos, *Rensselaer Polytechnic Institute*; Mohammed Alnaggar, *Rensselaer Polytechnic Institute*; Roman Wendner, *University of Natural Resources and Life Sciences Vienna*

**718: Rebar Concrete Bond Degradation under Combined Effects of Alkali-Silica Reaction and Corrosion**

Lauren Stenroos, *Rensselaer Polytechnic Institute*; Mohammed Abdelatif, *Rensselaer Polytechnic Institute*; Elsayed Salem, *Rensselaer Polytechnic Institute*; Mohammed Alnaggar, *Rensselaer Polytechnic Institute*

**610: Temporal Probabilistic Capacity Models of Prestressed Concrete Piles in Corrosive Marine Environments Using Metamodeling Techniques**

Jieun Hur, *The Ohio State University*; Abdollah Shafieezadeh, *The Ohio State University*

**720: Determining the Critical Chloride Threshold for Corrosion of Steel Reinforcing Rebars in Synthetic Concrete Pore Solution**

Michael Kubista, *Rensselaer Polytechnic Institute*; David Duquette, *Rensselaer Polytechnic Institute*; Mohammed Alnaggar, *Rensselaer Polytechnic Institute*

M-3-4 — EMI-MS-11/12: Multiscale Mechanics of Bio-Inspired and Biological Materials and Structures

4:15 PM – 5:45 PM

**760: Micromechanics of Plastically Sliding Interfaces: Theoretical Foundations and Application to Bone**

Viktoria Vass, *Vienna University of Technology*; Claire Morin, *Ecole Nationale Supérieure des Mines de Saint-Etienne*; Christian Hellmich, *Vienna University of Technology*

**161: Role of Organic-Inorganic Interface Properties in Brick and Mortar Composites**

Sina Askarinejad, *Worcester Polytechnic Institute*; Nima Rahbar, *Worcester Polytechnic Institute*

**761: A Continuum Micromechanics Approach to the Elasticity of Planar Fiber Networks: Applications to Paper Materials**

Pedro Miguel J. S. Godinho, *Vienna University of Technology*; Leopold Wagner, *Vienna University of Technology*; Viktoria Vass, *Vienna University of Technology*; Josef Eberhardsteiner, *Vienna University of Technology*; Christian Hellmich, *Vienna University of Technology*

**512: Bioinspired Design of Cement Polymer Composites**

Jessica Rosewitz, *Worcester Polytechnic Institute*; Liliana Urso, *Assumption College*; Christopher Flanagan, *Worcester Polytechnic Institute*; Nima Rahbar, *Worcester Polytechnic Institute*

**644: Chemomechanics of Soft Hydrogels as a Water Reservoir in a Cementitious Matrix**

Khashayar Farzanian, *University of Miami*; Ali Ghahremaninezhad, *University of Miami*

**705: Thermally Activated Building Envelope for Integrated Hazard Mitigation and Thermal Load Management: An Inspiration from Homoeothermic Animal Skin**

Hongyu Zhou, *The University of Alabama in Huntsville*; Adam Brooks, *The University of Alabama in Huntsville*; Zhenglai Shen, *The University of Alabama in Huntsville*

M-3-5 — EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics

4:15 PM – 5:45 PM

**253: Finite Strain Wave Propagation Analysis in the Micromorphic Media**

Farhad Shahabi, *University of Colorado Boulder*; Richard Regueiro, *University of Colorado Boulder*

**461: Parallel Asynchronous Space-Time Method for Computational Structural Dynamics**

Waad Subber, *University of Notre Dame*; Sangmin Lee, *University of Notre Dame*; Karel Matous, *University of Notre Dame*

**588: Multiscale Finite Element Modeling for Nonlinear Wave Propagation**

Negar Kamali, *University of Illinois at Chicago*; Sheng-Wei Chi, *University of Illinois at Chicago*

**54: Transient Solid Dynamics on Linear Tetrahedral Finite Elements Using a Variational Multi-Scale Approach**

Guglielmo Scovazzi, *Duke University*; Xianyi Zeng, *Duke University*; Simone Rossi, *Duke University*

**183: Modeling Stiffness and Damping in the Dynamic Analysis of Stranded Conductor Cables**

Nicholas Oliveto, *University at Buffalo*; Mettupalayam Sivaselvan, *University at Buffalo*

**522: Computational Aspects of Morphological Instabilities**

Berkin Dortdivanlioglu, *Stanford University*; Ali Javili, *Stanford University*; Christian Linder, *Stanford University*

M-3-6 – EMI-MS-16: Multiphysics and Multiscale Modeling of Engineering Materials  
4:15 PM – 5:45 PM

**557: Modeling of Heterogeneous Quasi-brittle Solids with Viscoelasticity, Interface, Nonlinear Fracture, and Multiphysical Phenomena**

Yong-Rak Kim, *University of Nebraska-Lincoln*; Keyvan Rami, *University of Nebraska-Lincoln*;  
Taesun You, *University of Nebraska-Lincoln*

**410: Hydro-Thermal Coupled Multiphysics Simulation for Health Monitoring of Embankment Dam**

Chung Song, *University of Nebraska-Lincoln*; Tewodros Yosef, *University of Nebraska-Lincoln*

**404: Simulation on Ethanol based Foaming Process in Asphalt Using Smooth Particle Hydrodynamics**

Siyu Zhu, *Columbia University*; Huiming Yin, *Columbia University*

**409: Virtual Experiments of the Chain-Structure Process of Magnetic Composites by the Inclusion Based Boundary Element Method (iBEM)**

Gan Song, *Columbia University*; Huiming Yin, *Columbia University*;

**499: The Three-Dimensional Response of Magnetic Shape Memory Alloys**

Heidi Feigenbaum, *Northern Arizona University*; Constantin Ciocanel, *Northern Arizona University*; Jason Dikes, *Northern Arizona University*

**388: Self-Heating of a Polymeric Particulate Composite Under Mechanical Excitations**

Zhenyu Shou, *Columbia University*; Fangliang Chen, *Columbia University*; Huiming Yin, *Columbia University*

M-3-7 — EMI-MS-20: Computational Geomechanics for Subsurface Energy Resources Exploitation  
4:15 PM – 5:45 PM



**100: An Inverse Source Problem for Maximizing Wave Motion in Subsurface Poroelastic Formations: A Computational Framework for Field Implementation of a Wave-Based Enhanced Oil Recovery Method.**

Pranav Karve, *The University of Texas at Austin*; Loukas Kallivokas, *The University of Texas at Austin*

**173: A Hybrid Multi-Scale Computational Framework for Transport Problems in Porous Media**

Saeid Karimi, *University of Houston*; Kalyana Babu Nakshatralla, *University of Houston*

**192: A Minimalist Model for Rapid Simulation of Multiple Hydraulic Fracture Growth**

Cheng Cheng, *University of Pittsburgh*; Andrew Bungler, *University of Pittsburgh*; Anthony Peirce, *University of British Columbia*

**264: An Approach to Track Crack Connectivity for Hydraulic Fracturing Using Graph and Disjoint-Set Data Structures**

Philip L. Clarke, *University of Tennessee Space Institute*; Reza Abedi, *University of Tennessee Space Institute*; Omid Omid, *University of Tennessee Space Institute*

**330: Three Dimensional Poroelastic Solution of an Inclined Borehole Subjected to Finite Length Fluid Injection**

Shengli Chen, *Louisiana State University*

**413: Microscale Modeling of Strain Localization in Bleurswiller Sandstone**

Shiva Esna Ashari, *Northwestern University*; Giuseppe Buscarnera, *Northwestern University*; Gianluca Cusatis, *Northwestern University*

M-3-8 — EMI-MS-24: Advanced Analysis for Earthquake Engineering

4:15 PM – 5:45 PM

**105: Performance Based Design of Diagrid Tall Buildings**

Mohammad Bhuiyan, *West Virginia State University*; Roberto Leon, *Virginia Tech*

**647: Seismic Fragility Assessment of Restrained Nonstructural Components Considering Multiple Modes of Failure and Existing Damage from Prior Events**

Jieun Hur, *The Ohio State University*; Abdollah Shafieezadeh, *The Ohio State University*

**84: Nonlinear Finite Element Simulation of Seismic Response and Damage of RC Structures**

Mohammadreza Moharrami Gargari, *Virginia Tech*; Ioannis Koutromanos, *Virginia Tech*

**471: Dynamic Instability and Sidesway Collapse Analysis of Framed Structures**

Kevin Wong, *National Institute of Standards and Technology*; Steven McCabe, *National Institute of Standards and Technology*

**664: Understanding Memristors and Memcapacitors in Engineering Mechanics Applications**

Jin-Song Pei, *University of Oklahoma*; Joseph Wright, *Weidlinger Associates*; Michael Todd, *University of California, San Diego*; Sami Masri, *University of Southern California*; Francois Gay-Balmaz, *CNRS*; Pavle Milicevic, *University of Oklahoma*

M-3-9 — EMI-MS-28: Fluid Dynamics in Natural Hazards
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4:15 PM – 5:45 PM
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**122: An Experimental Study of Rod-Like Debris Flight with Particular Application to Fire Spotting**

Ali Tohidi, *Clemson University*; Nigel Kaye, *Clemson University*

**766: Atmospheric Boundary Layer Simulation and Aerodynamics Investigations of Low-Rise Buildings in an Open-Jet Facility**

Hamzeh Gol Zaroudi, *Louisiana State University*; Aly Mousaad Aly, *Louisiana State University*

**111: Temperature and Moisture Effects on the Hurricane Wind Field based on a Simplified Model**

Reda Snaiki, *University at Buffalo—SUNY*; Teng Wu, *University at Buffalo—SUNY*

**182: Large-Eddy Simulation of Atmospheric Boundary Layer Winds for Structural Engineering Applications**

DongHun Yeo, *National Institute of Standards and Technology*; Liang Shi, *National Institute of Standards and Technology*

**767: A Framework for Hurricane Hazard Mitigation in Traffic Lighting Support Structures**

Hamzeh Gol-Zaroudi, *Louisiana State University*; Milad Rezaee, *Louisiana State University*; Aly Mousaad Aly, *Louisiana State University*

**782: Design of a New Experimental Facility for Simulating Wind-Induced Damage on Solar Systems**

Elena Dragomirescu, *University of Ottawa*; Zhe Xiao, *University of Ottawa*; Derek Eden, *University of Ottawa*

**PARALLEL SESSIONS – TUESDAY, MAY 24**

**Parallel Session 1 – 9:45 AM – 11:30 AM**

<p><b>T-1-1 – EMI-MS-09: Cementitious Materials: Experiments and Modeling Across the Scales</b> 9:45 AM – 11:30 AM</p>
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**480: Characterization of Chemical Composition and Microstructure of Synthesized Alkali-Silica Gel with Small-Angle Neutron and X-Ray Scattering**

Shuaicheng Guo, *Michigan Technological University*; Xiao Sun, *Michigan Technological University*; Qingli Dai, *Michigan Technological University*

**584: The Mesoscale Texture of Cement Hydrates**

Katerina Ioannidou, *Massachusetts Institute of Technology*; Franz-Josef Ulm, *Massachusetts Institute of Technology*; Emanuela Del Gado, *Georgetown University*; Roland Pellenq, *Massachusetts Institute of Technology, CNRS*

**218: Isochoric Creep of Hydrate Gel Needles Explains Macroscopic Creep of Cementitious Materials**

Markus Königsberger, *Vienna University of Technology*; Muhammad Irfan-ul-Hassan, *Vienna University of Technology*; Christian Hellmich, *Vienna University of Technology*; Bernhard Pichler, *Vienna University of Technology*

**538: Multi- Scale Probabilistic Analysis of the Elastic Modulus of Concrete Using Digital Image Processing**

Maha Mrad, *American University of Beirut*; George Saad, *American University of Beirut*; Ghassan Chehab, *American University of Beirut*

**547: Microstructure and Nanomechanical Properties of the Interfacial Transition Zone in Geopolymer Concrete with Different Molar Ratios of  $\text{SiO}_2/\text{Na}_2\text{O}$  of Alkaline Activator**

Hani Alanazi, *University of Nebraska-Lincoln*; Yong-Rak Kim, *University of Nebraska-Lincoln*

**582: Reinforcing Cementitious Structures by In-Situ Shrinking Microfibers**

Patrick C. Lee, *University of Vermont*; Ting Tan, *University of Vermont*; Eric Kim; Louis Kiefer, *University of Vermont*; Dryver Huston, *University of Vermont*

**528: Application of Functional Quantization to Probabilistic Service-Life Models for Corrosion of Reinforced Concrete**

Manuel Miranda, *Hofstra University*; Gabriella Sampaio, *Federal University of Bahia*

**251: Free Surface and Non-Newtonian Flow using Lattice Boltzmann Method: An Application in Wellbore Cementing**

Matthew Grasinger, *University of Pittsburgh*; Julie Vandebossche, *University of Pittsburgh*; John Brigham, *University of Pittsburgh*

T-1-2 – EMI-MS-14: Advances in Experimental, Theoretical and Computational Fracture Mechanics

9:45 AM – 11:30 AM

**360: Direct Evaluation of Stress Intensity Factors for Curved Cracks Using Irwin's Integral and a High-Order Extended Finite Element Method**

Yongxiang Wang, *Columbia University*; Haim Waisman, *Columbia University*; Isaac Harari, *Tel Aviv University*

**269: A Phase Field Model for Diffusion Induced Fracture in Lithium-Ion Batteries**

Xiaoxuan Zhang, *Stanford University*; Christian Linder, *Stanford University*

**291: Virtual Crack Extension Method for Elasto Plastic Fracture Analysis Using the Complex Finite Element Method**

Arturo Montoya, *The University of Texas at San Antonio*; Harry Millwater, *The University of Texas at San Antonio*

**304: Fracture Investigation of Organic Rich Shale: Microscopic to Macroscopic Scale**

Pooyan Kabir, *University of Illinois at Urbana Champaign*; Yue Cui, *University of Illinois*; Ange Akono, *University of Illinois at Urbana Champaign*

**380: Stochastic Analysis of Polymer Composites Failure in Large Deformations Modeled by a Phase Field Method**

Jie Wu, *Columbia University*; Colin McAuliffe, *Columbia University*; Haim Waisman, *Columbia University*; George Deodatis, *Columbia University*

**568: Elasticity and Fracture of Clay-Based Materials at the Nano-Scale**

Jeremie Berthonneau, *Massachusetts Institute of Technology*; Christian Hoover, *Massachusetts Institute of Technology*; Olivier Grauby, *CINaM/CNRS*; Alain Baronnet, *CINaM/CNRS*; Roland

Pellenq, *Massachusetts Institute of Technology*; Franz Josef Ulm, *Massachusetts Institute of Technology*

**415: General Elements for XFEM Using Physically-Based Enrichment Parameters**

Iman Asareh, *University of South Carolina*

T-1-3 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics

9:45 AM – 11:30 AM

**155: Advances in Fluid-Structure Interaction Simulations of Wind Turbines, Aerospace and Offshore Structures**

Artem Korobenko, *University of California, San Diego*; Jinhui Yan, *University of California, San Diego*; Xiaowei Deng, *University of California*; Yuri Bazilevs, *University of California, San Diego*

**555: Computational FSI with Applications**

Yuri Bazilevs, *University of California, San Diego*

**599: Foundation Structure Interaction for Wind Turbine Towers**

Sukhvarsh Jerath, *University of North Dakota*; Sam Austin, *University of North Dakota*

**403: A Two-Scale Nonlinear Generalized FEM for the Simulation of Spot Welds in Large Structures**

Haoyang Li, *University of Illinois at Urbana-Champaign*; C. Armando Durate, *University of Illinois at Urbana-Champaign*

**433: Analysis of Three-Dimensional Curved Beams Using Isogeometric Approach**

Guodong Zhang, *University of Notre Dame*; Ryan Alberdi, *University of Notre Dame*; Kapil Khandelwal, *University of Notre Dame*

**514: Mean-Strain 10-Node Tetrahedron with Energy-Sampling Stabilization**

Alireza Pakravan, *University of California, San Diego*; Petr Krysl, *University of California, San Diego*

**523: A Computational Approach to Model Strain-Induced Crystallization in Rubber**

Reza Rastak, *Stanford University*; Christian Linder, *Stanford University*

**655: Efficient Model Order Reduction of Problems with Material Nonlinearities Using a Localized Discrete Empirical Interpolation Method**

Fariborz Ghavamian, *Delft University of Technology*; Paolo Tiso, *ETH Zurich*; Angelo Simone, *Delft University of Technology*

T-1-4 – EMI-MS-19: Computational Geomechanics
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9:45 AM – 11:30 AM
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**231: Mini-Symposium Keynote: Poromechanical Cohesive Surface Element with Elastoplasticity for Modeling Cracks and Interfaces in Fluid-Saturated Geomaterials**

Richard Regueiro, *University of Colorado Boulder*; John Sweetser, *Lockheed Martin Space Systems Company*; Wei Wang, *Lawrence Livermore National Laboratory*; Erik Jensen, *University of Colorado Boulder*

**110: Modeling Hydraulic Fracture of Ice Shelves Using Continuum Damage Mechanics**

Mostafa Mobasher, *Columbia University*; Ravindra Duddu, *Vanderbilt University*; Jeremy Bassis, *University of Michigan*; Haim Waisman, *Columbia University*

**609: A Peridynamic Model for Hydraulic Fracture**

John Foster, *The University of Texas at Austin*; Jason York, *The University of Texas at Austin*; Hisanao Ouchi, *The University of Texas at Austin*; Mukul Sharma, *The University of Texas at Austin*

**271: Effects of Material Spatial Randomness on Dynamic Fracturing in Rocks**

Omid Omid, *University of Tennessee Space Institute*; Reza Abedi, *University of Tennessee Space Institute*; Philip L. Clarke, *University of Tennessee Space Institute*; Saeid Enayatpour, *The University of Texas, Austin*

**532: Run-Out Distance and Depositional Configuration for Flow-Like Landslides Using the SPH Method**

Alomir Favero, *Stanford University*; Ronaldo Borja, *Stanford University*

**309: Quantitative Analysis of the Micro-Mechanisms of Piping Erosion with Coupled CFD-DEM Method**

Hui Tao, *University of Akron*; Junliang Tao, *University of Akron*

T-1-5 – EMI-MS-21: Fluid-Dependent Mechanics of Porous Materials: A Focus on the Nanoscale

9:45 AM – 11:30 AM

**222: Interaction Grand Potential between Calcium-Silicate-Hydrate Nanoparticles at the Molecular Level**

Patrick Bonnaud, *Tohoku University*; Christophe Labbez, *Laboratoire Interdisciplinaire Carnot de Bourgogne, UMR 6303, Université de Bourgogne*; Riuji Miura, *Tohoku University*; Ai Suzuki, *Tohoku University*; Naoto Miyamoto, *Tohoku University*; Nozomu Hatakeyama, *Tohoku University*; Akira Miyamoto, *Tohoku University*, Krystyn Van Vliet, *Massachusetts Institute of Technology*

**527: Meso-Chemo-Mechanics of Calcium-Silicate-Hydrates**

Saeed Masoumi, *University of New South Wales, Australia & University of California, Irvine*; Hamid Valipour, *University of New South Wales, Australia*; Mohammad Javad Abdolhosseini Qomi, *University of California, Irvine*

**347: Multi-Scale Modeling of Adsorption-Induced Deformation of Micro-Porous Materials**



Mingyang Chen, *Empa*; Karol Kulasinski, *ETHZ*; Benoit Coasne, *Laboratoire Interdisciplinaire de Physique CNRS and Université Joseph Fourier Grenoble*; Robert Guyer, *U. Nevada Reno*; Dominique Derome, *Empa*; Jan Carmeliet, *ETHZ*

**178: Continuum Mechanics with Violations of Second Law of Thermodynamics**

Martin Ostojia-Starzewski, *University of Illinois at Urbana-Champaign*

**119: Multiscale Modeling of Textural and Mechanical Properties of Clay**

Davoud Ebrahimi, *Massachusetts Institute of Technology*; Andrew Whittle, *Massachusetts Institute of Technology*; Roland Pellenq, *Massachusetts Institute of Technology*

**493: Effect of Relative Humidity on Basal Spacing and Stiffness of Stack of Clay Layers**

Linlin Wang, *Laboratoire Navier, CNRS*; Benoît Carrier, *Laboratoire Navier, ENPC*; Sébastien Brisard, *Laboratoire Navier, IFSTTAR*; Matthieu Vandamme, *Laboratoire Navier, ENPC*

**745: On the Nanoscale Origins of Time-Dependent Deformations in Nanoporous Materials**

György Hantal, *Université de Pau et des Pays de l'Adour*; Guillaume Galliero, *Université de Pau et des Pays de l'Adour*; Romain Vermorel, *Université de Pau et des Pays de l'Adour*; Gilles Pijaudier-Cabot, *Université de Pau et des Pays de l'Adour*

**435: Transient Effects of Drying Creep in Nanoporous Solids: Understanding the Effects of Nanoscale Energy Barriers**

Robert Sinko, *Northwestern University*; Matthieu Vandamme, *Laboratoire Navier*; Zdeněk Bažant, *Northwestern University*; Sinan Keten, *Northwestern University*

T-1-6 – EMI-MS-27: Advances and Applications of Elasticity within Applied Mechanics 9:45 AM – 11:30 AM
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**276: The Use of Shape Memory Alloys in Near-Surface Mounted Strengthening Applications**

Sherif M. Daghash, *University of Virginia*; Osman E. Ozbulut, *University of Virginia*

**279: Development of Fiber-Reinforced Polymer Composites with Superelastic Shape Memory Alloys**

Sherif M. Daghash, *University of Virginia*; Osam E. Ozbulut, *University of Virginia*

**377: Characterization of Mechanical and Electrical Properties of SMA-PVA Fiber-Reinforced Cementitious Composites**

Muhammad M. Sherif, *University of Virginia*; Radhika Pavgi, *University of Virginia*; Evelina Khakimova, *University of Virginia*; Osman E. Ozbulut, *University of Virginia*; H. Celik Ozyildirim, *Virginia Center for Transportation Innovation and Research*

**448: Investigation of Stress-Induced Martensite Transformation in a Large-Diameter NiTiNb Bar for Self-Stressing Applications**

Muhammad M. Sherif, *University of Virginia*; Osman E. Ozbulut, *University of Virginia*

**520: Prediction of Material Consolidation in In718 Produced Using Selective Laser Melting in the Higher Throughput Parameter Regime**

Tracie Prater, *National Aeronautics and Space Administration*

**69: Three-Dimensional Displacement Field of Isotropic Elastic Spheres**

K.T. Chau, *The Hong Kong Polytechnic University*

**587: A Simple, Unified and Accurate Scheme for the Evaluation of Singular and Quasi-Singular Integrals in the 2D Boundary Element Method**

Ney Augusto Dumont, *PUC-Rio - Pontifical Catholic University of Rio de Janeiro*; Carlos Andres Aguilar, *PUC-Rio - Pontifical Catholic University of Rio de Janeiro*; Wellington Tatagiba De Carvalho, *CEFET - Centro Federal de Educação Tecnológica Celso Suckow da Fonseca*

**354: Robust Topology Optimization of Skeletal Structures Under Uncertainty in Elements' Out-of-Straightness**

Babak Ahmadi, *University of Massachusetts Dartmouth*; Mehdi Jalalpour, *Cleveland State University*; Mazdak Tootkaboni, *University of Massachusetts Dartmouth*

T-1-7 – EMI-MS-29/31: Modeling and Mitigation of Coastal Hazards/ High-performance Computing (HPC) Applications in Riverine, Coastal, and Ocean Engineering  
9:45 AM – 11:30 AM

**109: A Simplified Analytical Wind-Field Model for Hurricane Boundary Layer**

Reda Snaiki, *University at Buffalo—SUNY*; Teng Wu, *University at Buffalo—SUNY*

**596: A Multi-Scale Multi-Physics Approach to Modeling Coastal Bridge Collapse**

Qin Jim Chen, *Louisiana State University*; Xuebin Chen, *Sun Yat-sen University*; Agnimitro Chakrabarti, *Louisiana State University*; Jiemin Zhan, *Sun Yat-sen University*

**487: Nonlinear and Directional Effects of Waves in Areas of High Dissipation: Implications for Coastal Hazard Characterization**

James Kaihatu, *Texas A&M University*; Ying-Po Liao, *Texas A&M University*; Samira Ardani, *Texas A&M University*

**586: Towards Incorporating Soil Substrate Properties into a Marsh Edge Erosion Model**

Cody Johnson, *Louisiana State University*; Qin Chen, *Louisiana State University*; Arash Karimpour, *Louisiana State University*; Navid Jafari, *Louisiana State University*; Thomas Everett, *Louisiana State University*

**624: Application of OpenFOAM in Solving Coastal Engineering Problems by Massively Parallel Navier Stokes Solvers Using Large Eddy Simulation Turbulence Closures**

Agnimitro Chakrabarti, *Louisiana State University*; Qin Jim Chen, *Louisiana State University*

**215: Computational Free-Surface FSI with Applications**

Jinhui Yan, *University of California, San Diego*; Artem Korobenko, *University of California, San Diego*; Xiaowei Deng, *University of California, San Diego*; Yuri Bazilevs, *University of California, San Diego*

**124: A Numerical Study on Modeling Heterogeneous Coastal Sediment Transport Using Multiphase Eulerian and Euler-Lagrangian Approaches**

Zhen Cheng, *University of Delaware*; Xiao Yu, *University of Delaware*; Tian-Jian Hsu, *University of Delaware*; Julien Chauchat, *LEGI, UMR 5519, UJF, INPG*; Joseph Calantoni, *Sediment Dynamics Section, Naval Research Laboratory*

**505: High Performance Computing in the Modeling of Recycled Water Release Infrastructure in the City of Gold Coast, Australia**

Lauren Schmied, *DHI Water & Environment, Inc*; Anna Symonds, *DHI Water & Environment, Pty Ltd*; Prema Bhautoo, *DHI Water & Environment, Pty Ltd*; Caroline Lai, *DHI Water & Environment Pty Ltd*; Simon, Mortensen, *DHI Water & Environment, Pty, Ltd*; Anna Hollingsworth, *Gold Coast Water, City of Gold Coast*; Daniel Grimwood, *Pawsey Supercomputing Centre*

T-1-8 - EMI-MS-32: Topology Optimization; Algorithms and Applications

9:45 AM – 11:30 AM

**771: Free Form Finding of Grid Shell Structures**

Yang Jiang, *Georgia Institute of Technology*; Lin Yan, *Collins Engineers Inc.*; Tomas Zegard, *Skidmore, Owings & Merrill, LLP*; Glaucio Paulino, *Georgia Institute of Technology*

**240: Optimization of Geometric Parameters of an Adjustable Module for Variable Depth Arch Bridges**

Yao Wang, *University of Notre Dame*; Ashley Thrall, *University of Notre Dame*; Thoedore Zoli, *HNTB Corporation*

**128: Multiple-Material Topology Optimization of Cellular Material Architectures**

Josephine Carstensen, *Johns Hopkins University*; James Guest, *Johns Hopkins University*

**163: Implementation of Functionally Graded Materials in Compliant Mechanism Design Using Topology Optimization**

Cian Conlan-Smith, *University of Illinois at Urbana-Champaign*; Kai A. James, *University of Illinois at Urbana-Champaign*

**164: Simultaneous Topology and Material Design Optimization of Functionally Graded Structures**

Kai James, *University of Illinois at Urbana-Champaign*; Anurag Bhattacharyya, *University of Illinois at Urbana-Champaign*, Cian Conlan-Smith, *University of Illinois at Urbana-Champaign*

**511: Topology Optimization for Additive Manufacturing**

Mikhail Osanov, *Johns Hopkins University*; Christopher B. Williams, *Virginia Tech*; James K. Guest, *Johns Hopkins University*

**774: Topology Optimization with Manufacturing Constraints: A Unified Projection-Based Approach**

Cicero de Lima; Sandro Vatanabe; Tiago Lippi; Emilio Silva; Glaucio Paulino, *Georgia Institute of Technology*

**773: Bridging Topology Optimization and Additive Manufacturing**

Tomas Zegard, *Skidmore, Owings & Merrill, LLP*; Glaucio Paulino, *Georgia Institute of Technology*

T-1-9 - EMI-MS-37: Computational Modeling in Civil Engineering
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9:45 AM – 11:30 AM
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**83: Triaxial Material Model for Concrete under Cyclic Loading**

Mohammadreza Moharrami Gargari, *Virginia Tech*; Ioannis Koutromanos, *Virginia Tech*

**35: Inelastic Coupled Yield Surface Development for Standard Steel Sections**

Harsha Manglekar, *New Mexico State University*; Benyam Belega, *New Mexico State University*; Tathagata Ray, *New Mexico State University*

**4: Constitutive Model for Steel Reinforcement under Cyclic Loading**

Se-Hyung Kim, *HDR Inc., Plymouth Meeting, PA*; Ioannis Koutromanos, *Virginia Tech*

**533: Plasticity Modeling of Liquefaction Effects under Sloping Ground Conditions:  
Investigation of Underlying Mechanisms and Recent Advancements**

Katerina Ziotopoulou, *Virginia Tech*; Ross Boulanger, *University of California, Davis*

**142: A Constitutive Model for Matching Modulus Reduction and Damping Behavior**

Samuel Yniesta, *University of California, Los Angeles*; Scott Brandenburg, *University of California, Los Angeles*

**650: Effect of Temperature and Performance of Stabilized Formulations for Viscous Fingering  
and Mixing in Porous Media**

Mohammad Shabouei, *University of Houston*; Kalyana Babu Nakshatralla, *University of Houston*

**254: Vertical Inertial Response of an Elastic Pile Embedded within Gibson's and Weathered  
Soils**

Josue Labaki, *University of Campinas*; Euclides Mesquita, *University of Campinas*; Nimal Rajapakse, *Carleton University*

T-1-10 – PMC-MS-01: Advanced Simulation-Based Approaches to Uncertainty Quantification  
and Reliability Analysis

9:45 AM – 11:30 AM

**18: Probabilistic Geotechnical Site Characterization through Stochastic Inverse Analysis of  
Geophysical Test Measurements**

Siddharth S. Parida, *University at Buffalo, The State University of New York*; Kallol Sett,  
*University at Buffalo, The State University of New York*; Puneet Singla, *University at Buffalo, The  
State University of New York*

**20: Effect of Actuator Delay on Uncertainty Quantification for Real-Time Hybrid Simulation**

Kai Chen, *San Francisco State University*; Weijie Xu; Cheng Chen, *San Francisco State University*;  
Tong Guo

**138: Reliability-Based Design for Analysis of Composite Patches for Naval Ship Structural Repair**

Jennifer Retherford, *University of Tennessee*; Stephanie TerMaath, *University of Tennessee*

**144: Probabilistic Framework to Assess Maximum Nonlinear Structural Response Based on Sensor Measurements**

Ajay Saini, *Georgia Institute of Technology*; Iris Tien, *Georgia Institute of Technology*

**311: A Stochastic Simulation Method of Ground Motions for Specified Earthquake Scenarios**

Christos Vlachos, *Columbia University*; Konstantinos G. Papakonstantinou, *Pennsylvania State University*, George Deodatis, *Columbia University*

**665: Identifiability Assessment of Nonlinear Structural System Identification Problems**

Hamed Ebrahimian, *University of California, San Diego*; Rodrigo Astroza, *University of California, San Diego*; Joel Conte, *University of California, San Diego*, Robert Bitmead, *University of California, San Diego*

**754: A Stochastic Model for the Human Heading for Uncertainty Quantification of TBI Prediction**

Kiubel Teferra, *Naval Research Laboratory*; Siddiq Qidwai, *Naval Research Laboratory*; Shankarjee Krishnamoorthy, *Naval Research Laboratory*

T-1-11 – PMC-MS-06: Model Uncertainty in Multidisciplinary Analyses
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9:45 AM – 11:30 AM
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**652: Challenges with Uncertainty Quantification for Hypersonic Aircraft Structures**

Benjamin Smarslok, *Air Force Research Laboratory*

**146: Impact of Boundary Conditions and Modeling Assumptions on the Coupled Response of Structural Panels in High Speed Flow**

Abhijit Gogulapati, *The Ohio State University*; Jack McNamara, *The Ohio State*

**156: Data-Driven Modeling of Full-Field Pressure Measurements for Aeroelastic Response Predictions**

Gregory Bartram, *Universal Technology Corporation*; Ricardo Perez, *Universal Technology Corporation*; Benjamin Smarslok, *AFRL Structural Sciences Center*

**356: Structural Response Sensitivity to Boundary Layer Transition in High Speed Flow**

Zachary Riley, *The Ohio State University*; Jack McNamara, *The Ohio State University*

**58: Probabilistic Modeling of Thermal Properties of Hot Structures and its Propagation to the Nonlinear Geometric Structural Response**

Pengchao Song, *Arizona State University*; Andrew Matney, *Arizona State University*; Raghavendra Murthy, *Arizona State University*; X.Q. Wang, *Arizona State University*; Marc Mignolet, *Arizona State University*

**277: Global Sensitivity Analysis for Time-Dependent, Multidisciplinary Simulation**

Erin DeCarlo, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*; Benjamin Smarslok, *AFRL-Structural Sciences Center*

**236: Budgeting Model Calibration Experiments with Expected Information Gain**

Diane Villanueva, *Universal Technology Corporation*; Benjamin Smarslok, *Air Force Research Laboratory*

<p>T-1-12 – PMC-MS-14: Risk/Reliability-Based and Robust Structural/Topology Optimization of Civil Structures Exposed to Natural and Man-Made Hazards</p> <p>9:45 AM – 11:30 AM</p>
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**44: Time-Space Probabilistic Model for Wind Speeds and Structural Responses**



Haoran Zhao, *Cornell University*; Mircea Grigoriu, *Cornell University*

**96: Revisiting Moment-Based Hermite Model for Estimation of Extreme Value Distributions of Non-Gaussian Response Processes**

Min Liu, *Beijing Jiaotong University*; Xinzhong Chen, *National Wind Institute, Texas Tech University*; Qingshan Yang, *Beijing Jiaotong University*

**657: Risk-Based Life-Cycle Management of Fatigue-Sensitive Structures**

Mohamed Soliman, *Oklahoma State University*

**9: Multi-Criteria Design of Fluid Viscous Dampers Based on Life-Cycle Performance Criteria and Risk-Aversion Principles**

Ioannis Gidaris, *Rice University*; Alexandros Taflanidis, *University of Notre Dame*; Georgios Mavroeidis, *University of Notre Dame*

**316: Reliability-Based Topology Optimization of Truss Structures Using a Discrete Filtering System**

Junho-Chun, *University of Illinois at Urbana-Champaign*; Glaucio H. Paulino, *Georgia Institute of Technology*; Junho Song, *Seoul National University*

**521: A Heuristic Seismic Optimization Approach Based on Topology Optimization**

Orlando Arroyo, *Pontificia Universidad Católica de Chile*; Abbie Liel, *University of Colorado Boulder*

**772: Reliability-Based Topology Optimization Using a New Method for Sensitivity Approximation**

Ke Liu, *Georgia Institute of Technology*; Glaucio Paulino, *Georgia Institute of Technology*; Paolo Gardoni, *University of Illinois*

**589: Performance-Based Multi-Hazard Topology Optimization of Structural Systems**

Arthriya Suksuwan, *University of Michigan*; Seymour M.J. Spence, *University of Michigan*

T-1-13 – PMC-MS-17: Modeling Resilient Infrastructure

9:45 AM – 11:30 AM

**724: Mini-Symposium Keynote: Time-Variant Seismic Resilience of Aging Bridge Networks**

Fabio Biondini, *Politecnico di Milano*; Luca Capacci, *Politecnico di Milano*; Andrea Titi, *Politecnico di Milano*

**86: Multi-Hazard Resilient and Sustainable (or MRS) Bridges – Stronger, Taller, Wider, Smarter?**

Mi G. Chorzepa, *University of Georgia*; Arash Saeidpour, *University of Georgia*

**187: Functionality-Fragility Surfaces: A Tool for Probabilistic Resilience Analysis of Bridges**

Aman Karamlou, *Lehigh University*; Paolo Bocchini, *Lehigh University*

**340: Resilience of Small Bridges in Case of Extreme Rainstorms**

Mario Lucio Puppio, *University of Pisa*; Linda Giresini, *University of Sassari*; Mauro Sassu, *University of Pisa*

**390: Seismic fragility Analysis and Resilience Assessment of Highway Bridges Incorporating the Effects of Cumulative Damage Due to Main Shock – Aftershock Earthquake Sequences**

Ioannis Gidaris, *Rice University*; Jamie Padgett, *Rice University*

**419: A General Formulation for Modeling Impacts of Deterioration on Reliability of Infrastructure Systems**

Gaofeng Jia, *University of Illinois at Urbana-Champaign*; Paolo Gardoni, *University of Illinois at Urbana-Champaign*

**713: Transportation Network Disruptions and Vulnerability Assessment for Retrofitting and Recovery Planning: An Agent-based Modeling Approach**

Alireza Mostafizi, *Oregon State University*; Haizhong Wang, *Oregon State University*; Dan Cox, *Oregon State University*; Lori Cramer, *Oregon State University*

T-1-14 – PMC-MS- 19: Characterization, Simulation, and Modeling of Random Heterogeneous Materials 9:45 AM – 11:30 AM
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**779: Residual Strength of Preloaded Quasibrittle Structures and Size Effect on Its Statistical Distribution Based on Nanomechanics**

Zdeněk Bažant, *Northwestern University*; Marco Salviato, *University of Washington*; Kedar Kirane, *Northwestern University*

**21: Stochastic Modeling of Hyperelastic Materials**

Brian Staber, *Universite Paris-Est*; Johann Guilleminot, *Universite Paris-Est*

**230: On Macro- and Multi-Scale Approximations for Micro-Scale Material Responses**

Mircea Grigoriu, *Cornell University*

**337: Mesoscale Material Properties Fields; Partitioning Strategies and Probabilistic Descriptions**

Sarah Baxter, *University of St. Thomas*; Katherine Acton, *University of St. Thomas*

**322: Generation of Higher-order Stochastic Material Morphologies Using Bispectral Representation Method**

Hwanpyo Kim, *Johns Hopkins University*; Michael Shields, *Johns Hopkins University*

**753: Optimization of Data Collection Protocols for Efficient Microstructure Reconstruction**

Kirubel Teferra, *Naval Research Laboratory*; Lori Graham-Brady, *Johns Hopkins University*; Michael Uchic, *Air Force Research Laboratory*; Michael Groeber, *Air Force Research Laboratory*

**405: A Comparison between Measured and Predicted Least Principal Stresses Using a Viscoplastic Model**

Fatemeh Rassouli, *Stanford University*; Mark Zoback, *Stanford University*; Shaochuan Xu, *Stanford University*

**708: Supervised Learning of Constitutive Laws**

Ramin Bostanabad, *Northwestern University*; Zeliang Liu, *Northwestern University*; Wei Chen, *Northwestern University*; Wing Kam Liu, *Northwestern University*

**Parallel Session 2 – 2:15 PM – 3:45 PM**

T-2-1 – EMI-MS-01/PMC-MS-04: Structural Identification and Damage Detection 2:15 PM – 3:45 PM
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**274: Crowdsourcing-Based Structural Health Monitoring Using Smartphones**

Ekin Ozer, *Columbia University*; Maria Q. Feng, *Columbia University*

**613: An Application of a Modified Colliding Bodies Optimization Algorithm in Health Monitoring of Structures Using Flexibility Changes**

Mohsen Maniat, *The University of Memphis*; Ali Zare Hosseinzadeh, *Center of Excellence for Fundamental Studies in Structural Engineering, Iran University of Science & Technology*; Mohammad Farshchin, *The University of Memphis*; Charles V Camp, *The University of Memphis*

**476: Structural Health Monitoring Using a Network of Smartphones**

Kyle Wyatt, *University of New Hampshire*; Tat Fu, *University of New Hampshire*; Rui Zhang, *University of New Hampshire*

**479: In Situ Material State Monitoring Using Embedded Cadmium Selenide Quantum Dots**

Cole Brubaker, *Vanderbilt University*; Talitha Frecker, *Vanderbilt University*; Ian Njoroge, *Vanderbilt University*; Kane Jennings, *Vanderbilt University*; Douglas Adams, *Vanderbilt University*

**333: Time-Scale Blind Source Separation Using Independent Component Analysis for Identification of Highly-damped Structures**

Arash Kamali-Asl, *University of Vermont*; Alireza Farzampour, *Virginia Polytechnic Institute and State University*; Babak Kamali-Asl

**73: Vibration Testing of an In-Service Pre-Stressed Concrete Highway Bridge Using Martlet Wireless Sensing System**

Xi Liu, *Georgia Institute of Technology*; Xinjun Dong, *Georgia Institute of Technology*; Yang Wang, *Georgia Institute of Technology*

T-2-2 –EMI-MS-02: Stability and Failure of Structures and Materials
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2:15 PM – 3:45 PM
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**33: Harmonic Analysis of Elliptical Hollow Section Tubes in Bending**

Finian McCann, *London South Bank University*; M. Ahmer Wadee, *Imperial College London*; Leroy Gardner, *Imperial College London*

**355: Stability Analysis of the Phase-Field Method for Fracture in Linear Elastic, Rate-Independent Plastic, and Visco-Plastic Materials**

Miguel Arriaga, *Columbia University*; Colin McAuliffe, *Columbia University*; Haim Waisman, *Columbia University*

**3: Theoretical Background of Steel Storage Tanks Buckling Design Equations: Assumptions and Limitations**

Sukru Guzey, *Purdue University*; Eyas Azzuni, *Purdue University*

**193: Observation and Model for Acoustic Emission Aftershocks Generated Around the Surface of Tensile Cracks in Crystalline Rock**

Andrew Bunger, *University of Pittsburgh*; James Kear, *CSIRO Energy*; Arcady Dyskin, *The University of Western Australia*; Elena Pasternak, *The University of Western Australia*

**364: Numerical Bifurcation Analysis of an Anisotropic Used Fuel Cladding Damage Model Incorporating Circumferential and Radial Hydride Responses**

Zhengshou Lai, *Clemson University*; Qiushi Chen, *Clemson University*; Jakob Ostien, *Sandia National Laboratories*

**751: Engineering Interpretations of Various Buckling Methodologies Used in Nuclear Design Code Evaluations of Rigid Strut Assemblies**

Dennis K. Williams, *LISEGA Inc.*; Shrikant Nargund, *LISEGA Inc.*

T-2-3 –EMI-MS-11/12: Multiscale Mechanics of Bio-Inspired and Biological Materials and Structures

2:15 PM – 3:45 PM

**174: The Effect of Water Molecules on Mechanical Properties of Bamboo Microfibrils**

Sina Youssefian, *Worcester Polytechnic Institute*; Nima Rahbar, *Worcester Polytechnic Institute*

**601: Multiscale Mechanics of Mechanochemically Responsive Elastomer**

Qiming Wang, *University Of Southern California*

**639: Energy Dissipation Strategies inside the Mantis Shrimp's Dactyl Club: Hypotheses and Biomimetics**

Nobphadon Suksangpanya, *Purdue University*; Nicolas Guarin, *Purdue University*; Nick Yaraghi, *University of California, Riverside*; Steven Herrera, *University of California, Riverside*; David Kisailus, *University of California, Riverside*; Pablo Zavattieri, *Purdue University*

**719: Implantable Magnetic Nanocomposites for Cancer Treatment**

Kwabena Kan-Dapaah, *Worcester Polytechnic Institute*; Nima Rahbar, *Worcester Polytechnic Institute*; Wole Soboyejo, *Princeton University*

**730: Patient-Specific Fracture Risk Assessment of Vertebrae: A Multiscale Approach Coupling X-Ray Physics and Continuum Micromechanics**

Romane Blanchard, *TU Wien- Vienna University of Technology*; Claire Morin, *Ecole Nationale Supérieure des Mines*; Andrea Malandrino, *Institute for Bioengineering of Catalonia*; Alain Vella, *University of Malta*; Zdenka Sant, *University of Malta*; Christian Hellmich, *TU Wien- Vienna University of Technology*

**526: The Mechanics of Biomimetic Polymer Artificial Muscles**

Heidi Feigenbaum, *Northern Arizona University*; Michael Shafer, *Northern Arizona University*; Daniel Pugh, *Northern Arizona University*; Matthew Fisher, *Northern Arizona University*

T-2-4 –EMI-MS-17: Modeling the Mechanics of Material Surfaces and Interfaces
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2:15 PM – 3:45 PM
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**226: Stabilized Interface Formulation for Frictional Dynamics**

Timothy Truster, *University of Tennessee, Knoxville*; Arif Masud, *University of Illinois at Urbana-Champaign*

**341: Simulation of 3-D Hydraulic Fracture Propagation and Interactions near a Wellbore**

Armando Duarte, *University of Illinois at Urbana-Champaign*; Piyush Gupta, *University of Illinois at Urbana-Champaign*

**583: Generation of Conformal Finite-Element Meshes from 3D Measurements of Microstructurally Small Fatigue-Crack Propagation**

Ashley Spear, *University of Utah*; Jacob Hochhalter, *NASA Langley Research Center*; Albert Cerrone, *GE Global Research Center*; Anthony Ingraffea, *Cornell University*

**637: A Phantom Node Approach for Modeling Intersecting Fractures**

Chandrasekhar Annavarapu, *Lawrence Livermore National Laboratory*; Randolph Settgest, *Lawrence Livermore National Laboratory*; Efrem Vitali, *Lawrence Livermore National Laboratory*; Joseph Morris, *Lawrence Livermore National Laboratory*

**137: Mesoscale Thermomechanical Modeling of Energetic Material Interfaces Under Transient Loading**

Ruize Hu, *Vanderbilt University*; Caglar Oskay, *Vanderbilt University*

**395: Effect of Thermal Fields on Interface Strength in Fibrous Composites: A DG Method with Consistently Evolving Stabilization**

Pinlei Chen, *University of Illinois*; Arif Masud, *University of Illinois*

T-2-5 –EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling

2:15 PM – 3:45 PM

**114: DEM Simulations of Failure Process of Continuum Based on Principle Stress Analysis**

Shunying Ji, *Dalian University of Technology*; Yongjun Li, *Dalian University of Technology*

**242: 3D Experimental Investigation of Local Shearing in Triaxial testing of Sand**

Andrew Druckrey, *University of Tennessee*; Khalid Alshibli, *University of Tennessee*

**249: 3D Experimental Investigation of Fabric Evolution during Triaxial Compression of Granular Materials**

Andrew Druckrey, *University of Tennessee*; Khalid Alshibli, *University of Tennessee*

**358: Influence of Particle Morphology on 3D Kinematic Behavior and Strain Localization of Sheared Sand**

Maha Jarrar, *University of Tennessee*; Khalid Alshibli, *University of Tennessee*; Boning Zhang, *University of Colorado*; Richard Regueiro, *University of Colorado*

**742: Investigation of Shear Bands in Granular Materials Using the Level Set Discrete Element Method**

Reid Kawamoto, *California Institute of Technology*



**418: Shear Induced Glass Transition in a Granular System**

Jie Zhang, *Shanghai Jiao Tong University*; Yinqiao Wang, *Shanghai Jiaotong University*; Yi Luo, *Shanghai Jiao Tong University*

T-2-6 –EMI-MS-36: Analytical and Experimental Investigations on Resilient Critical Infrastructure under Multiple Hazards

2:15 PM – 3:45 PM

**43: Dynamics of Wind Turbine Structures Subjected to Hurricane Winds**

Gholamreza Amirinia, *Florida State University*; Sungmoon Jung, *Florida State University*

**48: Vulnerability Estimation of Low-Rise Buildings against Wind Hazard Considering Uncertainty in Building Components**

Grzegorz Kakareko, *Florida State University*; Sungmoon Jung, *Florida State University*; O. Arda Vanli, *Florida State University*; Spandon Mishra, *Florida State University*

**141: Simulation of Wind and Wave Field for Coastal Infrastructures**

Jin Zhu, *University of Connecticut*; Wei Zhang, *University of Connecticut*

**234: Mitigation of Structural Response Due to Near-Field Seismic Ground Motion Using an Optimized Innovative Rotational Inertia Damping Device**

Abdollah Javidialesaadi, *University of Tennessee, Knoxville*; Nicholas Wierschem, *University of Tennessee*

**157: Variable Input Space Controller for Multi-Hazard Mitigation**

Liang Cao, *Iowa State University*; Simon Laflamme, *Iowa State University*

**762: Wind-Wave Induced Vibration Control of Offshore Floating Wind Turbines**

Chao Sun, *Louisiana State University*

T-2-7 –EMI-MS-37: Computational Modeling in Civil Engineering

2:15 PM – 3:45 PM

**325: Reduced Order Modeling for Progressive Collapse Simulation of RC Structures**

Li Shan, *University of California at Davis*; Sashi Kunnath, *University of California at Davis*

**649: Nonlinear Analysis of Concrete Members Exposed to Elevated Temperatures**

Manar Al Fadul, *University of Central Florida*; Kevin Mackie, *University of Central Florida*

**207: Thermo-Mechanical Modeling of Reinforced Concrete Masonry Infill Panels Exposed to Fire**

Puneet Kumar, *Michigan State University*; Gaurav Srivastava, *Indian Institute of Technology Gandhinagar*

**149: 2D Meso-Scale Modeling of Masonry Elements Using Cohesive Elements**

Shenghan Zhang, *Ecole Polytechnique Fédérale de Lausanne (EPFL)*; Seyedeh Mohadeseh Taheri Mousavi, *Ecole Polytechnique Fédérale de Lausanne (EPFL)*; Nicolas Richart, *Ecole Polytechnique Fédérale de Lausanne (EPFL)*; Jean-François Molinari, *Ecole Polytechnique Fédérale de Lausanne (EPFL)*; Katrin Beyer, *Ecole Polytechnique Fédérale de Lausanne (EPFL)*

**489: Elastoplastic and Geometrically Nonlinear Analysis of Frame Structures Based on Generalized Total Potential Energy Functional**

Charalampos Andriotis, *Pennsylvania State University*; Konstantinos Papakonstantinou, *Pennsylvania State University*

**715: Verification of the Spectral Period Range for Ground Motion Scaling in Structural Nonlinear Dynamic Analysis**

Bo Chen, *Institute of Geophysics, China Earthquake Administration*; Zengping Wen, *Institute of Geophysics, China Earthquake Administration*

T-2-8 – PMC-MS-02: Probabilistic Methods for Fatigue Damage Monitoring, Diagnosis and Prognosis

2:15 PM – 3:45 PM

**11: Probabilistic Fatigue Life Assessment of Reinforced Concrete Structures Subjected to Corrosion**

Yafei Ma, *Changsha University of Science & Technology*; Yibing Xiang, *Arizona State University*; Lei Wang, *Changsha University of Science & Technology*; Jianren Zhang, *Changsha University of Science & Technology*; Yongming Liu, *Arizona State University*

**45: Probabilistic Detection of Delamination in Composite Laminates Using Bayesian Inference of Lamb Wave Signals**

Tishun Peng, *Arizona State University*; Yongming Liu, *Arizona State University*

**263: Probabilistic Mesoscale Simulation of High Cycle Fatigue by Mixed Trans-Intergranular Crack Growth Method**

Hao Yuan, *University of Connecticut*; Wei Zhang, *University of Connecticut*; Jeongho Kim, *University of Connecticut*

**104: Damage Decision Support Synthesizing Inspected Structural Health**

Mark Groden, *University of Michigan*; Matthew Collette, *University of Michigan*

**694: A Reliability-Based Approach to Probabilistic Remaining Useful Life Prediction in Mechanical Systems**

Shankar Sankararaman, *NASA Ames Research Center (SGT Inc.)*

**241: Robust Bayesian Fatigue Monitoring of Structures Using Minimal Instrumentation**

Nestor Polanco, *University of Vermont*; Eric Hernandez, *University of Vermont*

T-2-9 – PMC-MS-07: Uncertainty Quantification and Model Verification and Validation in Multiscale Simulation

2:15 PM – 3:45 PM

**726: A Survey of Methods for Integration of Uncertainty and Model Form Error in Prediction**

Joshua Mullins, *Sandia National Laboratories*; Benjamin Schroeder, *Sandia National Laboratories*; Richard Hills, *Sandia National Laboratories*

**580: Representing Model Error in Reduced Combustion Mechanisms: A Stochastic Operator Approach**

Rebecca Morrison, *The University of Texas at Austin*; Robert Moser, *The University of Texas at Austin*; Todd Oliver, *The University of Texas at Austin*

**171: Estimation and Rectification of Model-Form Errors in Transonic Reynolds-Averaged Navier Stokes Simulations**

Sophia Lefantzi, *Sandia National Laboratories*; Jaideep Ray, *Sandia National Laboratories*; Srinivasan Arunajatesan, *Sandia National Laboratories*; Lawrence Dechant, *Sandia National Laboratories*

**438: Uncertainty Quantification for Multi-Scale Mortar Discretizations**

Tim Wildey, *Sandia National Labs*; Bart van Bloemen Waanders, *Sandia National Labs*

**688: Process Parameter Uncertainty in Additive Manufacturing of Metals**

John Turner, *Oak Ridge National Laboratory*; Naren Raghavan, *University of Tennessee, Knoxville*; Sudarsanam Babu, *University of Tennessee, Knoxville*; Wael Elwasif, *Oak Ridge National Laboratory*; Ryan Dehoff, *Oak Ridge National Laboratory*

T-2-10 - PMC-MS-11: Objective Resilience in Engineering Mechanics

2:15 PM – 3:45 PM

**17: Long Wave Instability for Progressive Collapse of Tall Steel Moment Frames**

Simos Gerasimidis, *University of Massachusetts*; Mohammed Ettouney, *Weidlinger Associates*

**34: Multifunctional Nano-Enhanced Materials for Infrastructure Protection**

Ahmed Al-Ostaz, *University of Mississippi*; Xiaobing Li, *University of Mississippi*; Hunain Alkhateb, *University of Mississippi*; Alexander Cheng, *University of Mississippi*

**590: Subsurface Damage and Scour Detection Using Deck Level Vibrations to Enhance Highway Bridge Maintenance and Resilience**

Amir Irhayyim, *University of Mississippi*; Chris Mullen, *University of Mississippi*

**335: Data-Driven Resiliency Management of Bridges in a Rail Network under Multiple Hazard Exposures**

Jerome Lynch, *University of Michigan*; Mohammed Ettouney, *Weidlinger Associates*

**206: Measuring and Managing Resiliency in Facilities**

Roger Grant, *National Institute of Building Sciences*

**190: Modeling the Interactions between Cyber Capabilities and Critical Infrastructure-Based Societal System Functioning in Disasters**

Xilei Zhao, *Johns Hopkins University*; Ian Miers, *Johns Hopkins University*; Matthew Green, *Johns Hopkins University*; Judith Mitrani-Reiser, *Johns Hopkins University*

<p>T-2-11 – PMC-MS-13: Quantification and Propagation of Uncertainty in Engineering Modeling and Design</p> <p>2:15 PM – 3:45 PM</p>
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**185: Issues in Generating Response Surfaces for Reliability Analysis of Large Complex Dynamic Systems**

Novonil Sen, *University of Arizona*; Hamoon Azizsoltani, *University of Arizona*; Achintya Haldar, *University of Arizona*

**392: Fatigue Reliability of Vibratory Systems Using a Nonlinear Damage Model**

Vasiliki Tsianika, *Oakland University*; Zissimos P. Mourelatos, *Oakland University*; Monica Majcher, *Oakland University*

**22: An Approach to Quantify Ground Motion Uncertainty for Incremental Dynamic Analysis**

Peng Deng, *Colorado School of Mines*; Shiling Pei, *Colorado School of Mines*; John van de Lindt, *Colorado State University*; Hongyan Liu, *Colorado School of Mines*; Chao Zhang, *Michigan Technological University*

**107: Safety Factor Calibration for Residual Hull Girder Ultimate Strength Analysis**

Eric VanDerHorn, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

**671: Statistical Modelling of Hurricane Trajectories in the North Atlantic Ocean for Structural Integrity and Damage Cost Estimation**

Wei Cui, *Northeastern University*; Luca Caracoglia, *Northeastern University*

**406: An Interval Approach for Analysis of Structures Subject to Uncertain Displacements**

Mehdi Modares, *Illinois Institute of Technology*

T-2-12 – PMC-MS-16: Bayesian Methods in Uncertainty Quantification and Probabilistic Engineering Design 2:15 PM – 3:45 PM
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**247: Bayesian Calibration of Spatially Varying Model Parameters with High-Dimensional Response**

Paromita Nath, *Vanderbilt University*; Zhen Hu, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

**466: Model Updating of Compressive Strength Constitutive Models for Cement Paste**

Yohanna Mejia, *University of South Carolina*; Juan M. Caicedo, *University of South Carolina*; Fabio Matta, *University of South Carolina*

**342: Calibration of Input Dependent Parameters in Multi-Fidelity Problems**

Ghina Absi, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

**542: A Bayesian Framework for Interactive Design of Staged Excavation Based on MSD**

Yingyan Jin, *University of Cambridge*; Giovanna Biscontin, *University of Cambridge*

T-2-13 – PMC-MS-18: System Reliability Effects in Infrastructure Systems
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2:15 PM – 3:45 PM
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**135: Algorithms for Bayesian Network Modeling of Multi-State Infrastructure Flow Systems**

Yanjie Tong, *Georgia Institute of Technology*; Iris Tien, *Georgia Institute of Technology*

**529: Cross-Entropy Based Adaptive Importance Sampling and its Application to High-Dimensional System Reliability Analysis**

Ziqi Wang, *Earthquake Engineering Research & Test Center, Guangzhou University*; Junho Song, *Seoul National University*

**576: Non-Homogenous Lévy Processes as a Degradation Model for the Efficient Reliability Estimation of Complex Systems**

Javier Riascos-Ochoa, *Universidad de Los Andes*, Mauricio Sanchez-Silva, *Universidad de Los Andes*, Georgia-Ann Klutke, *Texas A&M University*

**94: Stochastic Design Optimization Involving Mixed Design Variables by Augmented Polynomial Dimensional Decomposition**

Xuchun Ren, *Georgia Southern University*; Sharif Rahman, *The University of Iowa*

**431: Treating System Reliability, Redundancy, Risk, and Sustainability as Performance-Based Design and Assessment Requirements in a Life-Cycle Context**

Samantha Sabatino, *Lehigh University*; Dan Frangopol, *Lehigh University*

**573: System Reliability Analysis of Wood-Sheathed Cold-Formed Steel Diaphragm Subsystems**

Aritra Chatterjee, *Virginia Tech*; Cristopher D. Moen, *Virginia Tech*; Sanjay R. Arwade, *University of Massachusetts Amherst*; Benjamin W. Schafer, *Johns Hopkins University*

Parallel Session 3 – 4:15 PM – 5:45 PM

T-3-1 – EMI-MS-01/PMC-MS-04: Structural Identification and Damage Detection 4:15 PM – 5:45 PM
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**238: Computational Health Monitoring of 3D Concrete Simple T Girders to Identify Objective Health Index Measure**

Eric Fletcher, *Kansas State University*; Hayder Rasheed, *Kansas State University*; Yacoub Najjar, *University of Mississippi*

**154: Damage Assessment of a Two-Story Masonry-Infilled RC Building from Vibration Data**  
Mingming Song, *Tufts University*; Seyedsina Yousefianmoghadam, *University at Buffalo*; Babak Moaveni, *Tufts University*; Andreas Stavridis, *University at Buffalo*; Richard Wood

**188: Damage Detection in Composite Plates Subjected to Large Deformations**

Han-Gyu Kim, *University of Washington*; Richard Wiebe, *University of Washington*; Michael Motley, *University of Washington*

**273: Smart Monitoring System Based on Electromechanical Impedance and Guided Ultrasonic Waves**

Amir Nasrollahi, *University of Pittsburgh*; Vincenzo Gulizzi, *University of Palermo, Italy*; Piervincenzo Rizzo, *University of Pittsburgh*

**763: Assessing the Structural Health of CFRP I-Beams under Bending: Electrical Resistance Methods and Ultrasonic Sensor Methods**



Siavash Peiday Saheli, *University of California*; Brian Pinto, *University of California*; Valeria La Saponara, *University of California*

**139: Identification of High-Resolution Vibration Modes of Structures from Video Camera Measurements Only**

Yongchao Yang, *Los Alamos National Laboratory*; Charles Dorn, *University of Wisconsin — Madison*; Tyler Mancini, *State University of New York at Buffalo*; Zachary Talken, *Missouri University of Science and Technology*; Garrett Kenyon, *Los Alamos National Laboratory*; Charles Farrar, *Los Alamos National Laboratory*; David Mascarenas, *Los Alamos National Laboratory*

T-3-2 – EMI-MS-02: Stability and Failure of Structures and Materials 4:15 PM – 5:45 PM
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**79: Vibration Analysis of Delaminated Composite Plates with Perturbation Method**

Pizhong Qiao, *Washington State University/Shanghai Jiao Tong University*; Hangbin Zhang, *Shanghai Jiao Tong University*

**71: Local-Global Mode Interaction in Thin-Walled Rectangular Hollow Section Struts**

Jiajia Shen, *Imperial College London*; Ahmer Wadee, *Imperial College London*; Adam Sadowski, *Imperial College London*

**556: Buckling and Postbuckling Analysis of Hat-Stringer-Stiffened Composite Panels**

Dongyun Ge, *Tsinghua University*; Yuming Mo, *Tsinghua University*; Boling He, *Tsinghua University*; Xuzhen Du, *Tsinghua University*; Bo Wang, *Tsinghua University*

**372: Buckling and Post-Buckling Analysis of Stiffened Composite Panels under Different Load Conditions**

Kan Feng, *BASTRI*; Lei Peng, *BASTRI*; Jifeng Xu, *BASTRI*

**121: Semi-Analytical Modelling of Post-Critical Delamination Growth in Buckled Composite Plates**

Anton Köllner, *Technische Universität Berlin*; Christina Völlmecke, *Technische Universität Berlin*

**51: A Hierarchical Finite Strip Method for Buckling Analysis of Composite Shells**

Jifeng Xu, *Beijing Aeronautical Science & Technology Research Institute*; Kan Feng, *Beijing Aeronautical Science & Technology Research Institute*

T-3-3 – EMI-MS-13: Computational Solids and Structural Mechanics: Theoretical and Numerical Applications

4:15 PM – 5:45 PM

**82: Crystal Plasticity Finite Element Based Modeling of Deformation-Twinning Induced Failure in Magnesium Alloy**

Jiahao Cheng, *Johns Hopkins University*; Somnath Ghosh, *Johns Hopkins University*

**92: Experimental and Numerical Analysis of Perforation Process for Selected Aluminum Alloys - Defining Friction Coefficient and Failure Criterion**

Maciej Klosak, *Universiapolis, Ecole Polytechnique d'Agadir*; Amine Bendarma, *Universiapolis, Ecole Polytechnique d'Agadir*; Alexis Rusinek, *University of Lorraine*; Tomasz Jankowiak, *Poznan University of Technology*

**102: Deformation and Failure Modeling of Polycrystalline Ti Alloys across a Range of Strain Rates**

Xiaohui Tu, *Johns Hopkins University*; Ahmad Shahba, *Johns Hopkins University*; Somnath Ghosh, *Johns Hopkins University*

**147: Thermo-Mechanical Description of C45 Steel over a Range of Temperatures and Loading Rates**

Farid Abed, *American University of Sharjah*; Mohammad Saffarini, *American University of Sharjah*

**117: Wave Propagation in Irregular Honeycombs**

Tanmoy Mukhopadhyay, *Swansea University*; Sondipon Adhikari, *Swansea University*

T-3-4 – EMI-MS-16: Multiphysics and Multiscale Modeling of Engineering Materials  
4:15 PM – 5:45 PM

**743: Atomistic to Continuum Homogenization Method**

Ranganathan Parthasarathy, *Tennessee State University*; Lizhi Ouyang, *Tennessee State University*;  
Anil Misra, *University of Kansas*

**299: Predicting Characteristics of Polymer Blends through a Rigorous Thermodynamical Modeling of Structural Length Scales**

Andreas Krischok, *Stanford University*; Lihua Jin, *Stanford University*; Christian Linder, *Stanford University*

**365: Multi-Scale Modeling of Mechanical Failure of Lithium-Ion Battery**

Chao Zhang, *National Renewable Energy Laboratory*; Shriram Santhanagopalan, *National Renewable Energy Laboratory*; Michael Sprague, *National Renewable Energy Laboratory*; Ahmad Pesaran, *National Renewable Energy Laboratory*

**366: Multi-Scale Micromechanical Modeling for Electrical Conductivity of Cementitious-Based Composite with Multi-Walled Carbon Nanotubes and Moisture**

Sung-Hwan Jang, *Carnegie Mellon University*; Daniel Hochstein, *Columbia University*; Shiho Kawashima, *Columbia University*; Huiming Yin, *Columbia University*

**485: Image-Based Multi-Scale Modeling and Simulations of High Energy Ball Milled Porous Composites**

Alberto Salvadori, *University of Notre Dame*; Sangmin Lee, *University of Notre Dame*; Karel Matous, *University of Notre Dame*

**518: Parallelized Coupling Simulation of a Multiphysical Problem in the Many Integrated Core (MIC) Architecture**

Moonho Tak, *Hanyang University*; Taehyo Park, *Hanyang University*

T-3-5 – EMI-MS-19: Computational Geomechanics

4:15 PM – 5:45 PM

**758: Modeling Thermal Softening Effects in Coupled THM Problems at Finite Strain**

WaiChing Sun, *Columbia University*; Claudio Tamagnini, *Universita degli Studi di Perugia*;

Federica Ronchi, *Universita degli Studi di Perugia*

**676: Computational Cryo-Mechanics for Frozen Soil**

SeonHong Na, *Columbia University*; WaiChing Sun, *Columbia University*

**611: On Performance of Implicit Integration for a Micropolar Critical State Model**

Majid Manzari, *The George Washington University*; Karma Yonten, *The George Washington*

*University*

**627: On Performance of Elements in the Finite Element Analysis of Strain Localization in Granular Soils Using Micropolar Constitutive Model**

Karma Yonten, *The George Washington University*; Majid Manzari, *The George Washington*

*University*

**692: Non Equilibrium Thermodynamics of Fault Gouge: Effect of Grain Contact Processes**

Ahmed Elbanna, *University of Illinois Urbana Champaign*

**214: Numerical and Experimental Study of Fluid-Particle Flow**

Lu Jing, *The University of Hong Kong*; Fiona Kwok, *The University of Hong Kong*; Andy Leung,

*The Hong Kong Polytechnic University*

T-3-6 – EMI-MS-26: Recent Advances in Rocking Isolation

4:15 PM – 5:45 PM

**455: Seismic Response Analysis of Slender, Free-Standing Columns and the Competing Effects of Size and Slenderness**

Nicos Makris, *University of Central Florida*; Georgios Kampas, *University of Central Florida*

**56: Experimental Verification of Common Assumptions Used in the Analysis of the Rocking Motion of Rigid Bodies**

Raphael Greenbaum; Andrew Smyth, *Columbia University*; Manolis Chatzis, *University of Oxford*

**554: A Preliminary Study of the Rocking Response of Artifacts Subjected to Sound Induced Vibrations**

Manolis Chatzis, *University of Oxford*; Maria Garcia Espinosa, *University of Oxford*

**478: Experimental Study for a Double Skin Façade Damper System**

Rui Zhang, *University of New Hampshire*; Tat Fu, *University of New Hampshire*

T-3-7 – EMI-MS-37: Computational Modeling in Civil Engineering
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4:15 PM – 5:45 PM
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**294: Nonlinear Finite Element Model Updating and Seismic Response Reconstruction of Marga-Marga Bridge During the Mw 8.8 Maule, Chile Earthquake**

Yong Li, *University of California, San Diego*; Rodrigo Astroza, *University of California, San Diego*; Joel Conte, *University of California, San Diego*

**626: Study of a Long Span Truss Bridge Using the Finite Element Model and Experimental Testing**

Ramesh Malla, *University of Connecticut*; Surendra Baniya, *University of Connecticut*; Suvash Dhakal, *University of Connecticut*; David Jacobs, *University of Connecticut*

**391: Numerical Evaluation of the Effects of Strain Localization and Asymmetric Damage Distribution on Damaged Rope Response**

Juan Beltran, *University of Chile*; Ramirez Nicolas, *University of Chile*

**452: Development of a Regional Performance-Based Seismic Assessment Framework for California's Highway Bridges**

Barbaros Cetiner, *University of California, Los Angeles*; Ertugrul Taciroglu, *University of California, Los Angeles*

**696: Finite Element Modeling for Optimal Design of Bridge Pot Bearings**

Najib Bouaanani, *Polytechnique Montreal*; Kimiya Zakikhani, *Polytechnique Montreal*; Tarik Fethi Saichi, *Polytechnique Montreal*

**181: Tsunami-Induced Forces on Bridge Components**

Andrew Winter, *University of Washington*; Michael Motley, *University of Washington*; Marc Eberhard, *University of Washington*

T-3-8 – EMI-MS-39: Modeling of Grain Boundaries and Grain Boundary-Driven Mechanics 4:15 PM – 5:45 PM
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**85: Decohesion Restrained by Emission of Dislocations**

Guoqiang Xu, *Massachusetts Institute of Technology*; Michael Demkowicz, *Massachusetts Institute of Technology*

**41: 3D Modeling of Grain Boundaries Using a Fully-Nonlocal and High-Performance Realization of the Quasicontinuum Method**

Ishan Tembhekar, *California Institute of Technology*

**40: A Mesoscale Model of Grain Boundary Faceting: The Role of Facet Junctions**

Fadi Abdeljawad, *Sandia National Laboratories*; Douglas Medlin, *Sandia National Laboratories*; Jonathon Zimmerman, *Sandia National Laboratories*; Khalid Hattar, *Sandia National Laboratories*; Stephen Foiles, *Sandia National Laboratories*

**272: Alloying Effects on Grain Boundary Motion and Microstructure Evolution**

Stephen Foiles, *Sandia National Laboratories*; Fadi Abdeljawad, *Sandia National Laboratories*;  
Christopher O'Brien, *Sandia National Laboratories*

**151: Modeling Anisotropic Grain Boundary Energy and Morphology in Polycrystal-Level Simulations**

Brandon Runnels, *University of Colorado Springs*

**PARALLEL SESSIONS – WEDNESDAY, MAY 25**

**Parallel Session 1 – 9:45 AM – 11:30 AM**

W-1-1 – EMI-MS-01/PMC-MS-04: Structural Identification and Damage Detection 9:45 AM – 11:30 AM
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**734: Fundamental Two-Stage Formulation for Bayesian System Identification**

Siu-Kui Au, *University of Liverpool*; Feng-Liang Zhang, *Tongji University*

**386: A Discontinuous Unscented Kalman Filter for Non-Smooth Problems**

Manolis Chatzis, *The University of Oxford*; Eleni Chatzi, *ETH Zürich*

**95: Online Bayesian Model Assessment for Structural Health Monitoring Using Nonlinear Filters**

Thaleia Kontoroupi, *Columbia University*; Andrew Smyth, *Columbia University*

**296: An Experimental Study on Finite Element Model Updating for a Pedestrian Bridge Considering Temperature Effects**

Shanglian Zhou, *The University of Alabama*; Wei Song, *The University of Alabama*

**63: Experimental Model Updating with Frequency Response Function Considering Damping Effect**

Yu Hong, *Southwest Jiaotong University*; Yang Wang, *Georgia Institute of Technology*

**248: Optimal Sequential Sensor Placement for Fatigue Damage Monitoring of Structures**

Eric Hernandez, *University of Vermont*

**212: System Identification and Bayesian Model Updating of a Cable-Stayed Bridge through Long-Term Structural Health Monitoring Using Wireless Smart Sensor Networks**

Parisa Asadollahi, *University of Kansas*; Jian Li, *University of Kansas*

W-1-2 – EMI-MS-07: Blast and Ballistic Impact Resistance of Materials and Structures

9:45 AM – 11:30 AM

**604: Mixed-Field Meshfree Method for Modeling Munitions Penetration in Soils**

Sheng-Wei Chi, *University of Illinois at Chicago*; Thanakorn Siriaksorn, *University of Illinois at Chicago*; Ashkan Mahdavi, *University of Illinois at Chicago*

**747: Modeling Projectile Penetration Mechanics in a Meshfree Computational Framework**

M. J. Roth, *U.S. Army Engineer Research and Development Center*; J. S. Chen, *University of California, San Diego*; J. A. Sherburn, *U.S. Army Engineer Research and Development Center*; T. R. Slawson, *U.S. Army Engineer Research and Development Center*; M. C. Hillman, *University of California, San Diego*

**47: An Investigation of Numerical Approaches for Analyzing Structural Response under Blast Loads**

Mason Hickman, *Vanderbilt University*; Prodyot Basu, *Vanderbilt University*

**700: Impact Response of Steel and Aluminum Foams**

Sanjay Arwade, *University of Massachusetts, Amherst*; Ignacio Cetrangolo, *University of Massachusetts, Amherst*; Andrew Rock, *University of Massachusetts, Amherst*; Nima Rahbar, *Worcester Polytechnic Institute*



**103: Approach to Blast Resistant Design of Urban Steel Structures with Little or No Stand-Off Distance**

Yongwook Kim, *Manhattan College*; Joseph Donato, *Manhattan College*; Michael McBrien, *Manhattan College*

**653: Breach Behavior of Soil-Filled Barriers Due to Blast**

Catherine S. Stephens, *U.S. Army Engineer Research and Development Center*; Omar G. Flores, *U.S. Army Engineer Research and Development Center*; Donald H. Nelson, *U.S. Army Engineer Research and Development Center*; Robert E. Walker, *U.S. Army Engineer Research and Development Center*; R. Nicholas Boone, *U.S. Army Engineer Research and Development Center*

**75: Blast Resistance of Concrete Protective Cladding with/without Cutouts**

Mohammed Alaloula, *Vanderbilt University*; Prodyot K. Basu, *Vanderbilt University*

**321: Long Duration Blast Loading and Debris Distribution of Masonry Structures**

Simon Clubley, *University of Southampton*; Richard Keys, *University of Southampton*

W-1-3 - EMI-MS-10: Modeling and Characterization of Quasibrittle Fracture
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9:45 AM – 11:30 AM
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**332: From Diffuse Damage to Sharp Cohesive Cracks: A Coupled XFEM Framework for Failure Analysis of Quasi-Brittle Materials**

Yongxiang Wang, *Columbia University*; Haim Waisman, *Columbia University*

**748: A Damage Analysis for Brittle Materials Using Stochastic Micro-Structural Information**

J.S. Chen, *University of California, San Diego*; Shih-Po Lin, *Ford Motor Company*

**153: Probabilistic Modeling of Failure of Polycrystalline Silicon MEMS Structures**

Roberto Ballarini, *University of Houston*; Jia-Lang Le, *University of Minnesota*

**376: Scaling of Fracturing Behavior of Graphene Reinforced Polymers: Experimental Characterization and Modeling**

Cory Hage, *University of Washington*; Marco Salviato, *University of Washington*

**169: Subcritical Crack Growth Induced by Coupled Chemo-Mechanical Attack in Hardened Cement Paste**

Weijin Wang, *University of Pittsburgh*; Teng Tong, *University of Pittsburgh*; Qiang Yu, *University of Pittsburgh*

**282: Cohesive Crack Analysis of Size Effect for Samples with Blunt and Sharp Notches**

Gianluca Cusatis, *Northwestern University*; Giovanni Di Luzio, *Politecnico di Milano*

**741: Transition from Ductile Shear to Brittle Tensile Failure Mode in Scratch Testing of Rocks**

Emmanuel Detournay, *University of Minnesota*; Jia-Liang Li, *University of Minnesota*

**581: Lattice Discrete Particle Modeling of Shear Failure in Reinforced Concrete Beams without Stirrups**

Sina Khodaie, *University of South Carolina*; Fabio Matta, *University of South Carolina*; Mohammed Alnaggar, *Rensselaer Polytechnic Institute*

W-1-4 – EMI-MS-13: Computational Solids and Structural Mechanics: Theoretical and Numerical Applications

9:45 AM – 11:30 AM

**68: Numerical Analysis on Continuous Impact Behavior of Cohesionless Soil with FEM-SPH Coupling Algorithm**

Weizhou Zhong, *China Academy of Engineering Physics*; Yuming Yang, *China Academy of Engineering Physics*; Zhiming Hao, *China Academy of Engineering Physics*; Xianjun Liu, *China Academy of Engineering Physics*; Zhifang Deng, *China Academy of Engineering Physics*

**469: Micromechanical Characterization and Modeling of Mechanical Property of Long-Term Aged Asphalt Binder Based on Inclusion Based Boundary Element Method**

Gan Song, *Columbia University*; Huiming Yin, *Columbia University*

**621: New Approach to Damage Mechanics through a Modified Finite Element Framework**

Parisa Khodabakhshi, *Texas A&M University*; J.N. Reddy, *Texas A&M University*; Arun Srinivasa, *Texas A&M University*

**394: Stabilized Methods for Coupled Thermomechanical Effects in Multi-Constituent Materials**

Harishanker Gajendran, *University of Illinois, Urbana-Champaign*; Arif Masud, *University of Illinois, Urbana-Champaign*

**31: Strain Rate Dependent Microplane Constitutive Model for Comminution of Concrete under Projectile Impact**

Kedar Kirane, *Northwestern University*; Yewang Su, *Northwestern University*; Zdenek Bazant, *Northwestern University*

**389: A Coupled DPD/DEM Model Towards Functionally Graded Material Fabrication by a Combined Vibration and Sedimentation Method**

Chensen Lin, *Columbia University*; Zhenyu Shou, *Columbia University*; Fangliang Chen, *Columbia University*; Huiming Yin, *Columbia University*

**408: Micromechanics-Based Elastoplastic Behavior of Functionally Graded Materials with Particle Interactions**

Qiliang Lin, *Columbia University*; Fanglaing Chen, *Columbia University*; Huiming Yin, *Columbia University*

**500: Computational Design of Interconnected, Polymer Composites for Impact Resistant Applications**

Muhammed Imam, *North Carolina A&T State University*; Trisha Sain, *North Carolina A&T State University*

W-1-5 – EMI-MS-14: Advances in Experimental, Theoretical and Computational Fracture Mechanics

9:45 AM – 11:30 AM

**257: Fracture Mechanisms of Microparticulate Composites via Macroscopic Scratch Testing**

Gregory A. Bouche, *University of Illinois at Urbana-Champaign*; Ange-Therese Akono, *University of Illinois at Urbana-Champaign*

**569: Multi-Scale Experimental Chemo-Mechanical Testing on Quartz: From Elasticity to Fracture**

Christian Hoover, *Massachusetts Institute of Technology*; Jeremie Berthonneau, *Massachusetts Institute of Technology*; Mathieu Bauchy, *University of California, Los Angeles*; Olivier Grauby, *Aix-Marseille Université – campus de Luminy*; Alain Baronnet, *Aix-Marseille Université – campus de Luminy*; Roland Pellenq, *Massachusetts Institute of Technology and Aix-Marseille Université – campus de Luminy*; Franz-Josef Ulm, *Massachusetts Institute of Technology*

**374: Applications of Mixed Mode Fracture Criteria for Cement Mortar and Asphalt Binder**

MirMilad Mirsayar, *Texas A&M University*; Philip Park, *Texas A&M University*

**640: Experimental Investigation into the Deformation and Failure of a Magnesium Alloy under Dominant Shear Loading**

Khashayar Farzanian, *University of Miami*; Ali Ghahremaninezhad, *University of Miami*

**456: Risk of Fracture at Early Ages: A Criterion for Cutting Pavement Joints**

Arghavan Louhghalam, *Massachusetts Institute of Technology*; Franz-Josef Ulm, *Massachusetts Institute of Technology*

**287: Investigation of Bone Fragility at Microscopic Length Scales**

Amrita Kataruka, *University of Illinois at Urbana-Champaign*; Kavya Mendu, *University of Illinois at Urbana-Champaign*; Okeoghene Orieka, *University of Illinois at Urbana-Champaign*; Ange T. Akono, *University of Illinois at Urbana-Champaign*

W-1-6 - EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics

9:45 AM – 11:30 AM

**345: Eigenstrain Based Reduced Order Homogenization for Polycrystalline Materials**

Xiang Zhang, *Vanderbilt University*; Caglar Oskay, *Vanderbilt University*

**503: A Comparison between the Finite Element Method and Material Point Method in Mesoscale Crystal Plasticity Simulations**

Brian Phung, *University of Utah*; Ashley Spear, *University of Utah*; Rebecca Brannon, *University of Utah*; Brian Leavy, *University of Utah*

**205: Primal Method for GND-Based Kinematic Hardening Model**

Omar Nassif, *University of Tennessee, Knoxville*; Timothy Truster, *University of Tennessee, Knoxville*

**91: The Adaptive Wavelet Enhancement of the Crystal Plasticity Finite Element Method**

Yan Azdoud, *Johns Hopkins University*; Jiahao Cheng, *Johns Hopkins University*; Somnath Ghosh, *Johns Hopkins University*

**106: A Preliminary Computational Investigation of the Efficacy of a Concept for Smart Material, Adaptive, and Reconfigurable (SMART) Building Surface Tiles**

Robert Zupan, *University of Pittsburgh*; Richard Beblo, *University of Dayton Research Institute*; Dale Clifford, *California Polytechnic State University*; John Brigham, *University of Pittsburgh*

**525: Models for Combined Irradiation-induced and Thermal Creep and Swelling for Analysis of Reactor Structures**

Jerome Solberg, *Lawrence Livermore National Laboratory*; Ryan Vignes, *Lawrence Livermore National Laboratory*

**780: Are the Cohesive Zone Models Necessary for Delamination Analysis?**

Zifeng Yuan, *Columbia University*; Jacob Fish, *Columbia University*

W-1-7 – EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling

9:45 AM – 11:30 AM

**131: From Discrete Particles to Continuum Fields**

Thomas Weinhart, *University of Twente*

**233: Multi-Scale Modelling of Segregating Granular Flows**

Anthony Thornton, *University of Twente*

**447: Effects of Centrifuge Testing Condition on the Dynamic Response of a Dry Sandy Slope**

Bo Li, *Rensselaer Polytechnic Institute*; Mourad Zeghal, *Rensselaer Polytechnic Institute*

**658: Micro-Polar Discrete-Continuum Coupling Method for Fluid-Infiltrating Porous Media**

Kun Wang, *Columbia University*; WaiChing Sun, *Columbia University*

**722: Grainsize Effects in the Comminution of Granular Materials: A Micromechanical Interpretation**

Yida Zhang, *Northwestern University*; Giuseppe Buscarnera, *Northwestern University*; Itai Einav, *University of Sydney*

**733: Experimental Inference of Inter-Particle Contact Forces in Granular Media under Shear Deformation**

Eloïse Marteau, *California Institute of Technology*; Jose Andrade, *California Institute of Technology*

**756: Grain Size-Effect in Granular Micromechanics**

Payam Poorsolhjoui, *University of Kansas*; Anil Misra, *University of Kansas*

W-1-8 – EMI-MS-32: Topology Optimization; Algorithms and Applications

9:45 AM – 11:30 AM

**591: Robust Design of Ultra-Dissipative Metamaterials via Stochastic Topology Optimization**

Alireza Asadpoure, *University of Massachusetts Dartmouth*; Mazdak Tootkaboni, *University of Massachusetts Dartmouth*

**429: Topology Optimization of Geometrically Nonlinear Trusses with Critical Load Constraint**

Lei Li, *University of Notre Dame*; Kapil Khandelwal, *University of Notre Dame*

**776: Nonlinear Topology Optimization Considering Plasticity through an Asymptotic Approach: A Polygonal Element Formulation**

Tuo Zhao, *Georgia Institute of Technology*; Adeildo Ramos Jr., *Federal University of Alagoas*; Glaucio Paulino, *Georgia Institute of Technology*

**165: Design of Bi-Stable Airfoil Using Topology Optimization**

Anurag Bhattacharyya, *University of Illinois at Urbana-Champaign*; Kai A. James, *University of Illinois at Urbana-Champaign*

**228: Stress-Based Topology Optimization of Continua with Material Uncertainty**

Hamid Kaboodanian, *Cleveland State University*; Navid Changizi, *Cleveland State University*; Mehdi Jalalpour, *Cleveland State University*

**577: Robust Lattice Architectures with Improved Stability Performance**

Mazdak Tootkaboni, *University of Massachusetts Dartmouth*; Alireza Asadpoure, *University of Massachusetts Dartmouth*; Lorenzo Valdevit, *University of California, Irvine*

**381: A Gradient Based Polynomial Chaos Approach for Topology Optimization under Uncertainty**

Vahid Keshavarzzadeh, *University of Illinois at Urbana-Champaign*; Daniel Tortorelli, *University of Illinois at Urbana-Champaign*

**777: Tensegrity Topology Optimization on Ground Structures**

Ke Liu, *Georgia Institute of Technology*; Glaucio Paulino, *Georgia Institute of Technology*

W-1-9 – EMI-MS-38: Quantitative Engineering Sustainability: Model Development and Data Analytics

9:45 AM – 11:30 AM

**457: Impact of Vehicle Speed and Traffic Flow on Pavement-Vehicle Interaction Emissions at the Network Level**

Arghavan Louhghalam, *Massachusetts Institute of Technology*; Mazdak Tootkaboni, *University of Massachusetts Dartmouth*; Marta Gonzalez, *Massachusetts Institute of Technology*; Franz-Josef Ulm, *Massachusetts Institute of Technology*

**482: Quantitative Assessment of Pavement Use Phase Impacts on Vehicle Fuel Consumption**

Mehdi Akbarian, *Massachusetts Institute of Technology*; Arghavan Louhghalam, *Massachusetts Institute of Technology*; Franz-Josef Ulm, *Massachusetts Institute of Technology*

**314: Modeling Agents and Environments at the Built-Human Interface**

Paul Torrens, *University of Maryland*

**687: Urban Heat Island: City Texture Matters**

Jake Sobstyl, *Massachusetts Institute of Technology*; Mohammad Javad Abdolhosseini Qomi, *University of California, Irvine*; Thorsten Emig, *Massachusetts Institute of Technology*; Roland Pellenq, *Massachusetts Institute of Technology*; Franz-Josef Ulm, *Massachusetts Institute of Technology*



**319: Sustainability Score for Urban Systems**

Ruda Zhang, *University of Southern California*, Roger Ghanem, *University of Southern California*

**140: City-Scale Structural Health Monitoring by Wide-range Video Camera Sensing and Novel Computer Vision**

Yongchao Yang, *Los Alamos National Laboratory*; Charles Farrar, *Los Alamos National Laboratory*; David Mascarenas, *Los Alamos National Laboratory*

**327: Sequential Damage Localization: A Data-driven Approach**

Yizheng Liao, *Stanford University*; Anne Kiremidjian, *Stanford University*; Ram Rajagopal, *Stanford University*

**558: Detecting Building Occupancy with Vibration Sensors and Machine Learning**

Roya Cody, *University of Waterloo*; Shounak Mitra, *University of New Hampshire, Durham*; Tat Fu, *University of New Hampshire, Durham*; Sriram Narasimhan, *University of Waterloo*; Nicholas Kirsch, *University of New Hampshire, Durham*

W-1-10 – EMI-MS-40: Advanced Numerical Methods in Computational Biomechanics 9:45 AM – 11:30 AM
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**677: Computational Fluid Dynamics Simulation of Potential Risk Factors in a Mouse Model of Pediatric Cerebrovascular Disease**

Shaolie Hossain, *Texas Heart Institute*; Travis Sanders, *University of Texas at Austin*; Zbigniew Starosolski, *Texas Children's Hospital*; Dianna Milewicz, *University of Texas Health Science Center Houston*; Ananth Annapragada, *Texas Children's Hospital*

**628: Cardiac Isogeometric Simulations Using Cubic Hermite Meshes with Extraordinary Nodes**

Arian Jafari, *Iowa State University*; Edward Pszczolkowski, *Iowa State University*; Adarsh Krishnamurthy, *Iowa State University*

**571: Discretisation Sensitivity of Voxel-Based Bone Models**

Martin Ruess, *University of Glasgow*

**346: Adaptive Discretizations for Bone-Implant Systems Using the Finite Cell Method**

Mohamed Elhaddad, *Technische Universität München*; Nils Zander, *Technische Universität München*; John Jomo, *Technische Universität München*; Stefan Kollmannsberger, *Technische Universität München*; Jan Bauer, *Abteilung für Neuroradiologie, Klinikum rechts der Isar der Technischen Universität München*; Martin Ruess, *University of Glasgow*; Ernst Rank, *Technische Universität München*

**698: A Computational Framework to Transfer 3D Imaging Data into a Multifield Flow Profile of the Liver**

Dominik Schillinger, *University of Minnesota*; Peter Mueller, *Technische Universität München*; Stein Stoter, *University of Minnesota*

**134: A Feasibility Study of a Shape Analysis Based Nondestructive and Noninvasive Material Property Characterization Strategy for the Human Right Ventricle Wall**

Jing Xu, *University of Pittsburgh*; Marc Simon, *University of Pittsburgh Medical Center*; Timothy Wong, *University of Pittsburgh Medical Center*; Wilkins Aquino, *Duke University*; John Brigham, *University of Pittsburgh*

**280: Computational 3D Fluid-Structure Interaction Involving Large Deformations**

Ye Chen, *Vanderbilt University*; Siyuan Chang, *Vanderbilt University*; Haoxiang Luo, *Vanderbilt University*

**693: Isogeometric Design and Analysis of Artificial Heart Valves**

Ming-Chen Hsu, *Iowa State University*; Austin J. Herrema, *Iowa State University*; Josh Mineroff, *Iowa State University*; Michael C. H. Wu, *Iowa State University*; Fei Xu, *Iowa State University*

W-1-11 – PMC-MS-09: Critical Infrastructure Systems Modeling: Risk, Reliability, and Resilience

9:45 AM – 11:30 AM

**159: Probabilistic Modeling of Interdependencies between Critical Infrastructure Systems for Resilience**

Chloe Johansen, *Georgia Institute of Technology*; Iris Tien, *Georgia Institute of Technology*

**765: Quantifying Resilience-Based Importance Measures Using Bayesian Kernel Methods**

Hiba Baroud, *Vanderbilt University*

**712: Understanding Interdependencies between Systems towards Resilient Critical Lifeline Infrastructures**

Haizhong Wang Wang, *Oregon State University*; Shangjia Dong, *Oregon State University*; Alireza Mostafizi, *Oregon State University*

**562: Building Portfolio Fragility Functions to Support Scalable Community Resilience Assessment and Effective Risk Communication**

Peihui Lin, *University of Oklahoma*; Naiyu Wang, *University of Oklahoma*

**484: The Impact of Recovery Time on the Lifecycle Performance of Infrastructures Exposed to Multiple Occurrences of Multiple Types of Hazards**

Ehsan Fereshtehnejad, *The Ohio State University*; Abdollah Shafieezadeh, *The Ohio State University*

**662: Cost-Effectiveness of Adaptation for Timber Distribution Poles Considering Climate Change**

Sigrídur Bjarnadóttir, *University of Hartford*; Yue Li, *Michigan Technological University*; Mark Stewart, *University of Newcastle*

**7: Influential Parameters on the Probabilistic Seismic Demand Models of Irregular Bridges**

Farahnaz Soleimani, *Georgia Institute of Technology*; Reginald DesRoches, *Georgia Institute of Technology*; Jamie E. Padgett, *Rice University*

**517: Life-Cycle Reliability Assessment of Corroded RC Bridges under Multiple Hazards**

Mitsuyoshi Akiyama, *Waseda University*; Dan Frangopol, *Lehigh University*; Thanapol Yanweerasak, *Waseda University*

W-1-12 – PMC-MS-12: Advances in Computational Modeling and Uncertainty Quantification for Analysis, Design and Management of Infrastructure Systems  
9:45 AM – 11:30 AM

**723: Redundancy Measures for Deteriorating Structures under Uncertainty**

Fabio Biondini, *Politecnico di Milano*; Dan Frangopol, *Lehigh University*

**308: Computing the Value of Information in Sequential Decision Making: An Auction-Based Formulation**

Milad Memarzadeh, *Carnegie Mellon University*; Matteo Pozzi, *Carnegie Mellon University*

**315: Dynamic Modeling of Urban Transportation System with Application to Resilience Planning**

Ruda Zhang, *University of Southern California*; Roger Ghanem, *University of Southern California*

**265: Optimizing Sensing Based on Value of Information Using Spatio-Temporal Probabilistic and Network Models of Infrastructure Systems**

Carl Malings, *Carnegie Mellon University*; Matteo Pozzi, *Carnegie Mellon University*

**675: Efficient Analysis and Optimization of Biofuel Integrated Systems under Uncertainties**

Jiatong Shen, *University of Illinois at Urbana-Champaign*; Hadi Meidani, *University of Illinois at Urbana-Champaign*

**654: A Probabilistic Life-Cycle Assessment for Quantifying the Effect of Design Life and Analysis Period on the Environmental Sustainability of Pavements**

Arash Noshadravan, *Texas A&M University*

**162: Sustainability Under Multiple Hazard Exposure: Life-Cycle Analysis for Bridges**

Navya Vishnu, *Rice University*; Jamie Padgett, *Rice University*

W-1-13 – PMC-MS-17: Modeling Resilient Infrastructure

9:45 AM – 11:30 AM

**64: Mechanical Behavior for Submarine Pipelines Crossing Active Strike-Slip Fault**

Longjun Xu, *University of Illinois at Urbana-Champaign*; Qingyang Liu, *Harbin Institute of Technology at Weihai*

**132: Resilience Quantification through Various Detection Indices of SHE<sup>TM</sup>**

Elizabeth K. Ervin, *The University of Mississippi*; Ethan R. B. Baker, *The University of Mississippi*

**378: A Stochastic Formulation to Model Resilience of Engineering Systems**

Neetesh Sharma, *University of Illinois at Urbana-Champaign*; Paolo Gardoni, *University of Illinois at Urbana-Champaign*; Armin Tabandeh, *University of Illinois at Urbana-Champaign*

**539: Optimal Design for Future Uncertainty with Adaptable Infrastructure**

Olga Špačková, *Technische Universität München*; Daniel Straub, *Technische Universität München*

**614: Modeling Resilient Infrastructure Combining Physical Damage and Loss and Restoration of Functionality: The Case of a Water Network**

Roberto Guidotti, *University of Illinois at Urbana-Champaign*; Hana T. Chmielewski, *National Institute of Standard and Technology*; Paolo Gardoni, *University of Illinois at Urbana-Champaign*; Therese P. McAllister, *National Institute of Standard and Technology*

**710: Modelling Post-Earthquake Recovery and Resilience of the Electric Power Supply Systems in Nepal**

Max Didier, *ETH Zurich*; Aike Steentoft, *ETH Zurich*, Siddhartha Ghosh, *IIT Bombay*; Bozidar Stojadinovic, *ETH Zurich*

**313: Examining the Dependencies of a School Building on Critical Physical Infrastructure for a Community Subjected to Tornado**

Hassan Masoomi, *Colorado State University*; John van de Lindt, *Colorado State University*

**732: A Wearable Wireless Sensor Network for Emergency Cases in Buildings Using a Customized Structural Health Monitoring System**

E. Sheikhi, *Politecnico di Torino*; G.P. Cimellaro, *Politecnico di Torino*

W-1-14 – PMC-MS-18: System Reliability Effects in Infrastructure Systems
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9:45 AM – 11:30 AM
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**396: Design Component and System Reliability in Low-Rise Formed Steel Framed Commercial Buildings**

Brooks Smith, *University of Massachusetts, Amherst*; Sanjay Arwade, *University of Massachusetts, Amherst*; Benjamin Schafer, *Johns Hopkins University*; Cristopher Moen, *Virginia Tech*

**397: Benefits of Load Redistribution to the Capacity of a Simple Cold-Formed Steel Floor System**

Brooks Smith, *University of Massachusetts, Amherst*; Sanjay Arwade, *University of Massachusetts, Amherst*; Benjamin Schafer, *Johns Hopkins University*; Cristopher Moen, *Virginia Tech*

**470: System reliability of Cold-Formed Steel Framed Shear Walls**

Guanbo Bian, *Johns Hopkins University*; Aritra Chatterjee, *Virginia Tech*; Stephen Buonopane, *Bucknell University*; Sanjay Arwade, *UMass Amherst*; Cristopher Moen, *Virginia Tech*; Benjamin Schafer, *Johns Hopkins University*

**574: Modeling of Pipeline Corrosion Deterioration Mechanism with a Lévy Process Based on ILI (In-Line) Inspections**

Rafael Amaya, *Universidad de Los Andes*; Javier Riascos-Ochoa, *Universidad de Los Andes*; Felipe Muñoz-Giraldo, *Universidad de Los Andes*

**781: Six Sigma-based Robust Design Optimization of Prestressed Girder Bridges**

Yassin Al-Delaimi, *University of Ottawa*; Elena Dragomirescu, *University of Ottawa*

**764: Efficient Multiline anchor systems for floating offshore wind turbines**

Casey Fontana, *University of Massachusetts*; Sanjay Arwade, *University of Massachusetts*; Don DeGroot, *University of Massachusetts*; Charles Aubeny, *Texas A&M University*; Melissa Maynard, *University of Maine*; Andrew Meyers, *Northeastern University*

**Parallel Session 2 – 2:15 PM – 3:45 PM**

<p>W-2-1 – EMI-MS-01/PMC-MS-04: Structural Identification and Damage Detection 2:15 PM – 3:45 PM</p>
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**363: Vibration-Based Health Monitoring of Wind Turbine Blades Under Operational Uncertainties**

Yaowen Ou, *ETH Zürich*; Eleni Chatzi, *ETH Zürich*; Vasilis Dertimanis, *ETH Zürich*; Minas Spiridonakos, *ETH Zürich*

**197: Dense Array of Soft Elastomeric Capacitors for Feature Extraction on Wind Turbine Blades**

Austin Downey, *Iowa State University*; Simon Laflamme, *Iowa State University*

**460: Analytical Study of Structural Damage Detection Using Stochastic Subspace Identification and Finite Element Model Updating**

Li Yang, *University of Louisville*; Young Hoon Kim, *University of Louisville*

**77: Structural Identification and Modeling of a Three-Story School Building Damaged During the 2015 Gorkha Earthquake**

Wen Yu Chang, *University at Buffalo*; Amin Nozari, *Tufts University*; Mohammad Shafiqul Alam, *Oregon State University*; Andreas Stavridis, *University at Buffalo*; Babak Moaveni, *Tufts University*; Andre Barbosa, *Oregon State University*; Richard Wood, *University of Nebraska*

**302: Image Processing for Damage Diagnosis and Uncertainty Quantification**

Yanqing Bao, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

W-2-2 – EMI-MS-03: Robustness of Infrastructures (Progressive Collapse)

2:15 PM – 3:45 PM

**125: New Euler-Type Progressive Collapse Curves for 3D Steel Frames**

Panagiotis Pantidis, *University of Massachusetts, Amherst*; Simos Gerasimidis, *University of Massachusetts, Amherst*

**29: Combined Effects of Catenary and Tensile Membrane Actions in Reinforced Concrete Beam-Slab Systems to Resist Progressive Collapse under Different Loading Methods**

Anh Tuan Pham, *Nanyang Technological University*; Kang Hai Tan, *Nanyang Technological University*

**67: Mechanical Modeling of Steel Top and Seat Angle Connections with and without Web Angles Subjected to Elevated Temperatures**

Sana El Kalash, *American University of Beirut*; Elie Hantouche, *American University of Beirut*

**412: Analytical Evaluation on the Effect of Damage Location on Collapse Performance of Reinforced Concrete Perimeter Frames**

Jorge Rivera, *University of Massachusetts Amherst*; Sergio Breña, *University of Massachusetts Amherst*; Simos Gerasimidis, *University of Massachusetts Amherst*



**578: The Role of Interior Gravity Columns on Blast-Induced Progressive Collapse Potential of Tall Buildings**

Jenny Sideri, *Columbia University*; Christopher L. Mullen, *University of Mississippi*; Simos Gerasimidis, *University of Massachusetts Amherst*; George Deodatis, *Columbia University*

**87: Effect of Creep on the Behavior of Flush Endplate Connections at Elevated Temperatures**

Ahmad El Ghor, *American University of Beirut*; Elie Hantouche, *American University of Beirut*; Mohammad Ali Morovat, *The University of Texas at Austin*

W-2-3 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics

2:15 PM – 3:45 PM

**353: A Non-Local Gradient-Enhanced Damage Model for Viscoelastic Materials**

Juan G. Londono, *Columbia University*; Luc Berger-Vergiat, *Columbia University*; Haim Waisman, *Columbia University*

**383: Multi-Yield Surface Modelling of Viscoplastic Materials**

Hao Yan, *Vanderbilt University*; Caglar Oskay, *Vanderbilt University*

**12: A Continuum Model for Additively Manufactured Lattice Meta-Materials**

Mark Messner, *Lawrence Livermore National Laboratory*; Holly Carlton, *Lawrence Livermore National Laboratory*; Mathew Barham, *Lawrence Livermore National Laboratory*; Mukul Kumar, *Lawrence Livermore National Laboratory*; Nathan Barton, *Lawrence Livermore National Laboratory*

**606: Reproducing Kernel Collocation Method for the Phase-Field Fracture Model**

Ashkan Mahdavi, *University of Illinois at Chicago*; Sheng-Wei Chi, *University of Illinois at Chicago*

**116: Modeling of the Mechanical Properties of CNTs Reinforced Concrete Based on Element-Free MLS Method**

Jianfei Wang, *City University of Hong Kong*; K.M. Liew, *City University of Hong Kong*

**245: A Numerical Approach to Describe Failure of Wood - From the Wood Cell Level up to Wood-Based Products**

Markus Lukacevic, *Vienna University of Technology (TU Wien), Institute for Mechanics of Materials and Structures*; Josef Füssl, *Vienna University of Technology (TU Wien), Institute for Mechanics of Materials and Structures*; Josef Eberhardsteiner, *Vienna University of Technology (TU Wien), Institute for Mechanics of Materials and Structures*

<p>W-2-4 – EMI-MS-17: Modeling the Mechanics of Material Surfaces and Interfaces 2:15 PM – 3:45 PM</p>
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**53: A Nitsche Method for Wave Propagation Problems and its in Time Domain**

Ting Song, *Duke University*; Guglielmo Scovazzi, *Duke University*

**292: A Variable Density Model for Water Air Structure Interaction Problems**

Kaspar Mueller, *University of Washington*; Michael Motley, *University of Washington*

**349: Embedded Interface Problems with Quadratic X-FEM: A Nitsche Approach**

Wen Jiang, *Idaho National Laboratory*; Yingjie Liu, *Duke University*; Chandrasekhar Annavarapu, *Lawrence Livermore National Laboratory*

**368: An Elasto-Plastic Constitutive Model for Monotonic and Cyclic Behaviour of Gravel-Structure Interface**

Miad Saberi, *Université Laval*; Charles-Darwin Annan, *Université Laval*; Ali Lashkari, *Shiraz University of Technology Shiraz*; Jean-Marie Konrad, *Université Laval*

**99: On the Parametric Sensitivity of Cohesive Zone Models for High-Cycle Fatigue Delamination of Composites**

Stephen Jimenez, *Vanderbilt University*; Ravindra Duddu, *Vanderbilt University*

W-2-5 – EMI-MS-18: High-Performance Infrastructure through Nano- and Microstructured Materials

2:15 PM – 3:45 PM

**680: Joining of Cu-Nb Multilayered Nanocomposites**

Majid Ramezani Goldyani, *Stevens Institute of Technology*; Marcus Rutner, *Stevens Institute of Technology*

**432: Length-Scale Effect on Wave Propagation in Periodic Micro-Lattices**

Ryan Alberdi, *University of Notre Dame*; Kapil Khandelwal, *University of Notre Dame*

**477: In-Situ Production of Nano/Micro Particles in Fresh Concrete**

Xin Qian, *The University of Alabama*; Jialai Wang, *The University of Alabama*

**501: Carbon Nanotube-Reinforced Structural Composites Enabled by the PopTube Approach**

William Guin, *The University of Alabama*; Jialai Wang, *The University of Alabama*

W-2-6 – EMI-MS-19: Computational Geomechanics

2:15 PM – 3:45 PM

**202: Hierarchical Upscaling to Inform Continuum Constitutive Models of Soils**

Erik Jensen, *University of Colorado Boulder*; Richard Regueiro, *University of Colorado Boulder*

**213: Multi-Scale Investigation of Damage-Fluid Flow in Porous Media with Cemented Microstructure**

Mahdad Eghbalian, *University of Calgary*; Richard Wan, *University of Calgary*

**737: Discrete Element Modeling of Heat Transfer in Granular Systems with Experimental Insight**

Jason Marshall, *California Institute of Technology*; Jose Andrade, *California Institute of Technology*

**434: The Establish of Particle Fracture Model in 3-Dimensional Discrete Element Method and its Application in Compression Simulation at High Strain Rate**

Boning Zhang, *University of Colorado Boulder*; Richard Regueiro, *University of Colorado Boulder*; Eric Herbold, *Lawrence Livermore National Laboratory*; Michael Homel, *Lawrence Livermore National Laboratory*

**668: Staggered Schemes for Multiscale Arlequin Poromechanics Problems**

WaiChing Sun, *Columbia University*; Zhijun Cai, *Columbia University*

**350: On Efficient and Robust Numerical Bifurcation Analysis of Fluid-Saturated Porous Geomaterials**

Qiushi Chen, *Clemson University*; Zhengshou Lai, *Clemson University*

W-2-7 – EMI-MS-37: Computational Modeling in Civil Engineering 2:15 PM – 3:45 PM
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**80: Performance-Based Design of Inundated Coastal Structures**

Trung Do, *Colorado State University*; John van de Lindt, *Colorado State University*; Daniel Cox, *Oregon State University*

**289: Infill Strut Model Class Uncertainty of Seismic Response of Reinforced Concrete Masonry Infilled Frames**

Mohammad S. Alam, *Oregon State University*; Andre R. Barbosa, *Oregon State University*

**2: Determination of Stresses in Step-Wise Cylindrical Steel Storage Tanks Under Hydrostatic Loading**

Eyas Azzuni, *Purdue University*; Sukru Guzey, *Purdue University*

**223: Assessment of Collapse Status of 220kV Guyed Portal Transmission Tower Subjected to Extreme Wind Loads**

Huawei Niu, *Wind Engineering Research Center of Hunan University*; Wei Zhang, *University of Connecticut*; Xugang Hua, *Wind Engineering Research Center of Hunan University*

**268: Modeling of Groups of Standing People over a Structure Using a Closed Loop Controller Model**

Albert R. Ortiz, *University of South Carolina*; Juan M. Caicedo, *University of South Carolina*

**361: Modeling of Leadership Behavior with an Extended Social Force Model for Crowd Evacuation in Buildings**

Yi Ma, *City University of Hong Kong*; Richard Kwok Kit Yuen, *City University of Hong Kong*; Eric Wai Ming Lee, *City University of Hong Kong*

<p>W-2-8 – EMI-MS-41: Inverse Problems for Tomographic Imaging and Remote Sensing Applications in Engineering 2:15 PM – 3:45 PM</p>
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**76: A Functionally Layered Sensing Skin for Structural Health Monitoring**

Mohammad Pour-Ghaz, *North Carolina State University*; Milad Hallaji, *WSP Group USA*; Aku Seppänen, *University of Eastern Finland*

**483: Strain and Damage Identification in Piezoresistive Nanocomposites Using Electrical Impedance Tomography with Constrained Sine-Wave Solutions**

Tyler Tallman, *Purdue University*

**362: Active Elastic-Wave Imaging of Heterogeneous Fractures: From Geometric Reconstruction to Interfacial Characterization**

Fatemeh Pourahmadian, *University of Minnesota*; Bojan Guzina, *University of Minnesota*

**318: Damage Detection and Localization Using Multifunctional Cement Composites and Electrical Impedance Tomography**

Sumit Gupta, *University of California, San Diego*; Jesus Gonzalez, *University of California, Davis*; Kenneth Loh, *University of California, San Diego*; Rongzong Wu, *University of California, Davis*; Navneet Garg, *Federal Aviation and Administration*

**260: Vibration Based Benchmark Problem for Human Activity Recognition**

Ramin Madarshahian, *University of South Carolina*; Juan M. Caicedo, *University of South Carolina*

**370: Heavy Tailed Distributions in Diffused Wave-Fields: A New Tool for Imaging through Scattering Media?**

Salvatore Buonocore, *University of Notre Dame*; Mihir Sen, *University of Notre Dame*; Fabio Semperlotti, *Purdue University*

<p>W-2-9 – EMI-MS-43: Recent Advances in Real-time Hybrid Simulation 2:15 PM – 3:45 PM</p>
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**422: Effective Implementation of Real-time Hybrid Simulation: Stability and Performance**

Amin Maghareh, *Purdue University*, Shirley Dyke, *Purdue University*

**298: Experimental Study on a Discrete-Time Compensation Technique for Real-time Hybrid Simulation**

Wei Song, *The University of Alabama*, Saeid Hayati, *The University of Alabama*

**486: An Improved Displacement Control Algorithm for Real-Time Hybrid Simulation**

Yunbyoung Chae, *Old Dominion University*; Chul-Young Kim, *Myongji University*

**636: An Explicit Numerical Integration Algorithm for Force-Based Hybrid Simulation**

Bahareh Forouzan, *Clarkson University*; Narutoshi Nakata, *Clarkson University*

**769: Distributed Real-Time Hybrid Simulation of Connected Base Isolated Buildings Author Information**

F. Avci; F. Peña; R.E. Christenson, *University of Connecticut*; S.J. Dyke; E.A. Johnson

W-2-10 – PMC-MS-08: Earthquake Hazards and Beyond: Opportunities for Integrating Geosciences and Engineering  
2:15 PM – 3:45 PM

**351: Probabilistic Assessment of Regional Liquefaction-Induced Settlement through Multiscale Random Field Models**

Chaofeng Wang, *Clemson University*; Qiushi Chen, *Clemson University*; C. Hsein Juang, *Clemson University*

**400: Engineering Validation of Simulated Ground Motions for Building Damage Assessment**

Alexandra Tsioulou, *University College London*; Carmine Galasso, *University College London*

**536: Time-Dependant Seismic Fragility models of RC buildings for Aging Considerations**

Zengping Wen, *Institute of Geophysics, China Earthquake Administration*; Fei Geng, *Institute of Geophysics, China Earthquake Administration*

**579: Multi-Field Meshfree Method for Landslide Simulations**

Thanakorn Siriaksorn, *University of Illinois at Chicago*; Sheng-Wei Chi, *University of Illinois at Chicago*

**186: Probabilistic Seismic Performance of Dry Cask Structures under Strong Ground Motions**

Majid Ebad Sichani, *Rice University*; Jamie Padgett, *Rice University*

W-2-11 – PMC-MS-17: Modeling Resilient Infrastructure  
2:15 PM – 3:45 PM

**199: Resilience-Based Risk Mitigation and Recovery for Highway Transportation Networks**

Weili Zhang, *University of Oklahoma*; Naiyu Wang, *University of Oklahoma*; Charles Nicholson, *University of Oklahoma*

**255: Integrating Water and Electric Systems in a Post-Earthquake Fire Analysis**

Negar Elhami Khorasani, *University at Buffalo*; Maria Garlock, *Princeton University*

**262: A Hybrid Algorithm to Solve the Time-Dependent Interdependent Network Design Problem**

Andrés D. González, *Rice University / Universidad de los Andes*; Leonardo Dueñas-Osorio, *Rice University*; Andrés L. Medaglia, *Universidad de los Andes*; Mauricio Sánchez-Silva, *Universidad de los Andes*

**286: The Critical Role of Interdependency in Infrastructure Resilience to Natural Hazards**

Dorothy Reed, *University of Washington*; Vipin Unnikrishnan, *Colorado State University*; John van de Lindt, *Colorado State University*; Paolo Gardoni, *University of Illinois*; Shuoqi Wang, *University of Washington*

**312: Resilience and Dependency Modeling of Critical Civil Infrastructures Using Graph Theory and Dynamic Inoperability Input-Output Model**

Xian He, *University of Illinois at Urbana-Champaign*; Eun Jeong Cha, *University of Illinois at Urbana-Champaign*

**731: A New Methodology to Model Interdependency of Critical Infrastructure Systems during Hurricane Sandy's Event**

Pietro Crupi, *The City College of New York*; Anil Agrawal, *The City College of New York*; Gian Paolo Cimellaro, *Politecnico di Torino*

<p>W-2-12 – PMC-MS-19: Characterization, Simulation, and Modeling of Random Heterogeneous Materials</p> <p>2:15 PM – 3:45 PM</p>
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**42: Variance Reduction Approaches for Random Materials Homogenization**

Frederic Legoll, *Ecole des Ponts*

**136: Mitigating Mesh Dependence of Stochastic Finite Element Analysis of Quasibrittle Fracture**

Jia-Liang Le, *University of Minnesota*; Jan Elias, *Brno University of Technology*

**270: Fracture Analysis of a Quasi-Brittle Material Based on a Random Field Representation of Micro-Cracked Domain**

Reza Abedi, *University of Tennessee Space Institute*; Philip L. Clarke, *University of Tennessee Space Institute*; Omid Omid, *University of Tennessee Space Institute*; Pavan Kumar, *Indian Institute of Technology*

**425: The Influence of Random Microstructure on Wave Propagation through Heterogeneous Media**

Inna Gitman, *University of Sheffield*; Yilang Song, *University of Sheffield*

**701: Stochastic Simulation of Random Material Microstructures Using Ellipsoidal Growth structures**

Nicolas Venkovic, *Johns Hopkins University*; Lori Graham-Brady, *Johns Hopkins University*