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

Achintya Haldar, *University of Arizona*

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

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
9:45 AM – 11:30 AM

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 B2OA 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 Omidi, *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

Xiaojia 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 Managament 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

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

2:15 PM – 3:45PM

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

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 Nakshatrala, *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
2:15 PM – 3:45PM

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

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

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 Sparsly 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 Kougioumtzoglou, *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 Kougioumtzoglou*, 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 Zwirglmaier, *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
4:15 PM – 5:45 PM

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

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, *Renssellaer Polytechnic Institute;* Mohammed Alnaggar, *Renssellaer 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 Nakshatrala, *University of Houston*

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

Cheng Cheng, *University of Pittsburgh;* Andrew Bunger, *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 Omidi, *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
4:15 PM – 5:45 PM

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

T-1-1 – EMI-MS-09: Cementitious Materials: Experiments and Modeling Across the Scales
9:45 AM – 11:30 AM

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 SiO2/Na2O 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 Vandenbossche, *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;* Hain 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
9:45 AM – 11:30 AM

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 Omidi, *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 Ostoja-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

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
9:45 AM – 11:30 AM

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 Brandenberg, *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 Nakshatrala, *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
9:45 AM – 11:30 AM

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*

T-1-12 – PMC-MS-14: Risk/Reliability-Based and Robust Structural/Topology Optimization of Civil Structures Exposed to Natural and Man-Made Hazards
9:45 AM – 11:30 AM

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

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

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
2:15 PM – 3:45 PM

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 Nanocompsites 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 Superieure 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
2:15 PM – 3:45 PM

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 Settgast, *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 dDelamination 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*

T-2-11 – PMC-MS-13: Quantification and Propagation of Uncertainty in Engineering Modeling and Design
2:15 PM – 3:45 PM

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

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
2:15 PM – 3:45 PM

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-Homogenenous 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

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

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
4:15 PM – 5:45 PM

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

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

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
9:45 AM – 11:30 AM

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 Eoil 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 Poorsolhjouy, *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 Tolopogy 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

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 Univeristät München;* Nils Zander, *Technische Univeristät München;* John Jomo, *Technische Univeristät München;* Stefan Kollmannsberger, *Technische Univeristät München;* Jan Bauer*, Abteilung für Neuroradiologie, Klinikum rechts der Isar der Technischen Universität München*; Martin Ruess*, University of Glasgow;* Ernst Rank, *Technische Univeristät 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 Universitaet Muenchen;* 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: I(mmer)sogeometric 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
Sigridur Bjarnadottir, *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^TM
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
9:45 AM – 11:30 AM

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;* Mauricio Sánchez-Silva, *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

W-2-1 – EMI-MS-01/PMC-MS-04: Structural Identification and Damage Detection
2:15 PM – 3:45 PM

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 Shafiqual 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*

W-2-4 – EMI-MS-17: Modeling the Mechanics of Material Surfaces and Interfaces
2:15 PM – 3:45 PM

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

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*

W-2-8 – EMI-MS-41: Inverse Problems for Tomographic Imaging and Remote Sensing Applications in Engineering
2:15 PM – 3:45 PM

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*

W-2-9 – EMI-MS-43: Recent Advances in Real-time Hybrid Simulation
2:15 PM – 3:45 PM

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

Yunbyeong 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*

W-2-12 – PMC-MS-19: Characterization, Simulation, and Modeling of Random Heterogeneous Materials
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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 Omidi, *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*