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

<table>
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<tr>
<th>Session</th>
<th>Title</th>
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<td>M-1-1 - EMI-MS-04</td>
<td>Multiscale Behavior of Damage and Failure Mechanics</td>
<td>Thomas Petersen, <em>Massachusetts Institute of Technology</em>, Franz-Josef Ulm, <em>Massachusetts Institute of Technology</em></td>
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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 Tau, 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 Malagú', 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
Mini-Symposium Keynote:

757: Micromorphic Model Including Grain Spins Based Upon Granular Micromechanics
Anil Misra, University of Kansas; Payam Poorsolhjoury, 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 MSSI MAT 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

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
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*
504: Utility Mapping and Subsurface Structural Assessment with Tri-Band Ground Penetrating Radar
Dryver Huston, University of Vermont; Tian Xia, University of Vermont; Yu Zhang, University of Vermont; Taian Fan, University of Vermont

553: Application of the Trajectory Cluster Analysis for Road Surface Monitoring
Jinwoo Jang, Columbia University; Andrew Smyth, Columbia University

416: Structure-Invariant Occupant Detection Using Footstep-Induced Structural Vibration
Mostafa Mirshekari, Carnegie Mellon University; Mike Lam, Carnegie Mellon University; Pei Zhang, Carnegie Mellon University; Hae Young Noh, Carnegie Mellon University

631: Estimator and Closed-Loop Performance of Wireless Control Systems under Intermittent Observations
Lauren Linderman, University of Minnesota

411: 20 Year Old Real-Time Sensor and Management Systems
Chung Song, University of Nebraska-Lincoln; Dong D. Yoon, GS Construction

462: Multiscale Monitoring and Health Assessment of Levees
Mourad Zeghal, Rensselaer Polytechnic Institute; Abdoun Tarek, Rensselaer Polytechnic Institute; Victoria Bennett, Rensselaer Polytechnic Institute

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*

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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*

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*
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*

107: Safety Factor Calibration for Residual Hull Girder Ultimate Strength Analysis
Eric VanDerHorn, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

Parallel Session 2 – 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
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

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*

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, Engineering 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

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

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

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*

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 Sparsely Sampled Discrete Random Functions in Multiple Dimensions
Justin Winokur, Sandia National Laboratories; Vicente Romero, Sandia National Laboratories

M-2-12 – PMC-MS-03: Uncertainty Modeling & Propagation Techniques in Stochastic Dynamics
2:15 PM – 3:45 PM

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

93: Limit-State Surrogate Based Reliability Estimation under Uncertainty
Saideep Nannapaneni, *Vanderbilt University*; Zhen Hu, *Vanderbilt University*; Sankaran Mahadevan, *Vanderbilt University*

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
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

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

338: Mini-Symposium Keynote: 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, *Rensselaer Polytechnic Institute*; Mohammed Alnaggar, *Rensselaer Polytechnic Institute*; Roman Wendner, *University of Natural Resources and Life Sciences Vienna*

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

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

| 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

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

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

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 – 9:30 AM – 11:30 AM

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

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
9:30 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*

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*

T-1-3 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics
9:30 AM – 11:30 AM

555: Computational FSI with Applications
Yuri Bazilevs, *University of California, San Diego*
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

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
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
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, University 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
9:30 AM – 11:30 AM

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

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

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

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

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

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

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

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

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
9:30 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 Gogulpati, *The Ohio State University*; Jack McNamara, *The Ohio State University*

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*

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
9:30 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 | 9:30 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

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, Université Paris–Est; Johann Guilleminot, Université 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 Hosseinazadeh, *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 Nanocomposites for Cancer Treatment
Kwabena Kan-Dapaah, Worcester Polytechnic Institute; Nima Rahbar, Worcester Polytechnic Institute; Wole Soboyejo, Princeton University

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

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 Kawamot, 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

43: Dynamics of Wind Turbine Structures Subjected to Hurricane Winds
Gholamreza Amirinia, Florida State University; Sungmoon Jung, Florida State University

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

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

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*

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2:15 PM – 3:45 PM

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**185: Issues in Generating Response Surfaces for Reliability Analysis of Large Complex Dynamic Systems**

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

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

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

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**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*

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**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*

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

Mehdi Modares, *Illinois Institute of Technology*
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

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

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

575: Assembly of Micro/Nanomaterials into Complex, Three-Dimensional Architectures by Compressive Buckling
Yonggang Huang, *Northwestern University*

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

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
627: On Performance of Elements in the Finite Element Analysis of Strain Localization in Granular Soils Using Micropolar Constitutive Model

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
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 Railroad 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
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, Colorado Springs

PARALLEL SESSIONS – WEDNESDAY, MAY 25

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

W-1-1 – EMI-MS-01/PMC-MS-04: Structural Identification and Damage Detection
9:30 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

783: A Texture-Based Video Processing Framework for Autonomous Crack Detection on Metallic Surfaces
Fu-Chen Chen, Purdue University; Mohammad Jahanshahi, Purdue University
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

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
9:30 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
9:30 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; Fangliang 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
9:30 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

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
9:30 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

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, Institute for Mechanics of Materials and Structures; Josef Füßl, Vienna University of Technology, Institute for Mechanics of Materials and Structures; Josef Eberhardsteiner, Vienna University of Technology, Institute for Mechanics of Materials and Structures

W-1-7 – EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling
9:30 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
9:30 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

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
9:30 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
9:30 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 Universität München; Nils Zander, Technische Universität München; John Jomo, Technische Universität München; Stefan Kollmannsberger, Technische Universität München; Jan Bauer, Abteilung für Neuroradiologie, Klinikum rechts der Isar der Technischen Universität München; Martin Ruess, University of Glasgow; Ernst Rank, Technische Universität München

698: A Computational Framework to Transfer 3D Imaging Data into a Multifield Flow Profile of the Liver
Dominik Schillinger, University of Minnesota; Peter Mueller, Technische 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
9:30 AM – 11:30 AM

517: Life-Cycle Reliability Assessment of Corroded RC Bridges under Multiple Hazards
Mitsuyoshi Akiyama, Waseda University; Dan Frangopol, Lehigh University; Thanapol Yanweerasak, Waseda University

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*

**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*

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**W-1-12 – PMC-MS-12: Advances in Computational Modeling and Uncertainty Quantification for Analysis, Design and Management of Infrastructure Systems**

9:30 AM – 11:30 AM

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**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**

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
9:30 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

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

E. Sheikhi, Politecnico di Torino; G.P. Cimellaro, Politecnico di Torino

W-1-14 – PMC-MS-18: System Reliability Effects in Infrastructure Systems
9:30 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, University of Massachusetts, 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

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

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*

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

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

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

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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
2:15 PM – 3:45 PM
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*