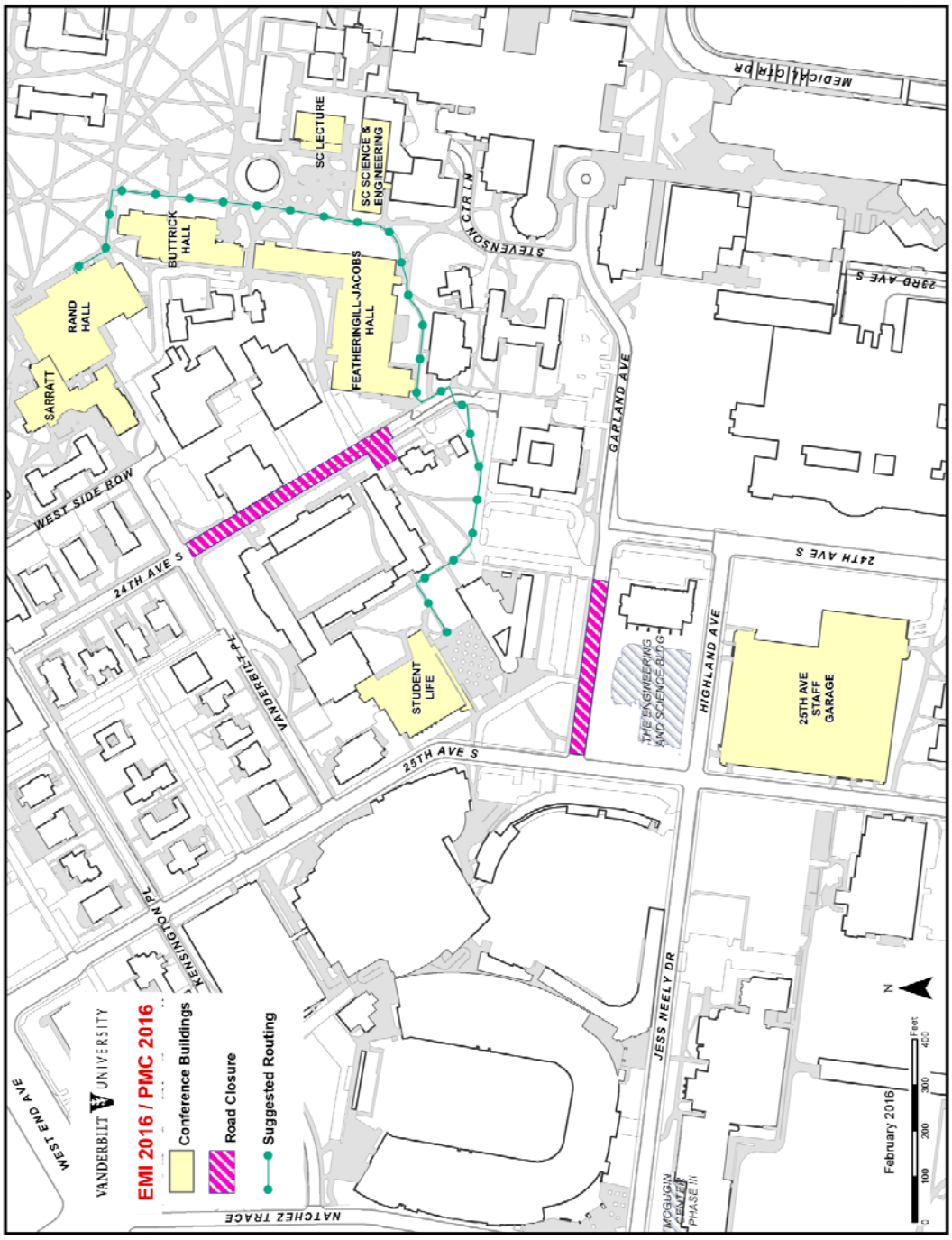
VANDERBILT
SCHOOL OF ENGINEERING

May 22 – 25, 2016
Nashville, TN

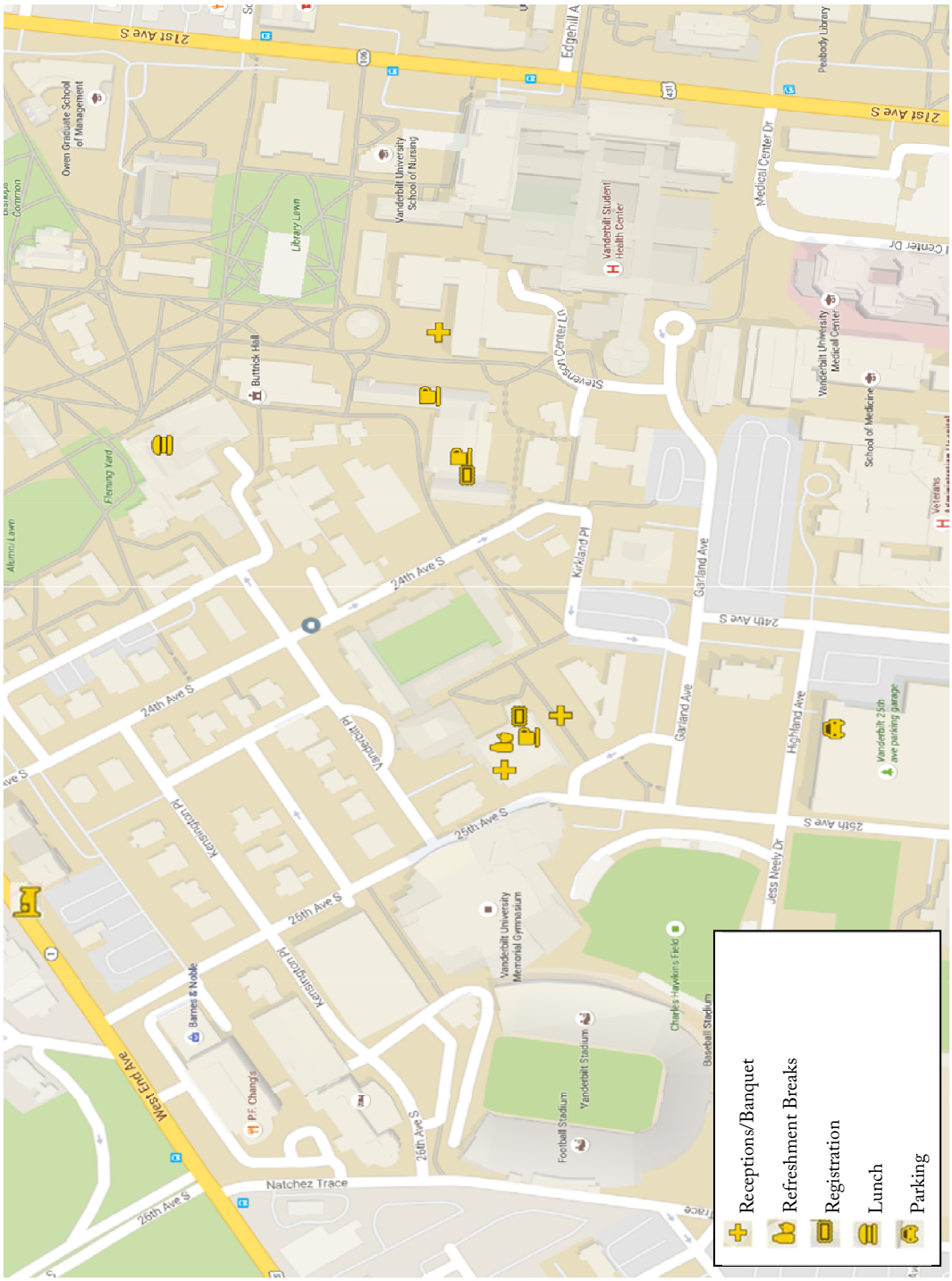
EMI 2016 / PMC 2016

Engineering Mechanics Institute Conference 2016

Probabilistic Mechanics & Reliability Conference 2016



CONFERENCE AREA LAYOUT



VANDERBILT CAMPUS MAP

CONFERENCE AT A GLANCE

Sunday, May 22, 2016

8:00 am – 4:00 pm	Board of Governors Meeting
9:00 am – 4:00 pm	Short Courses
1:00 pm – 6:00 pm	EMI Committee Meetings
5:30 pm – 7:00 pm	Registration
6:00 pm – 8:00 pm	Ice Breaker Reception – Stevenson Center Courtyard

Monday, May 23, 2016

7:30am – 5:30pm	Registration – Student Life Center / Featheringill-Jacobs Hall
7:30am – 8:00am	Coffee/Breakfast – Student Life Center
8:00am – 8:15am	Welcoming Remarks
8:15am – 9:15am	Plenary Lecture – Student Life Center, Ballroom
9:15am – 9:45am	Coffee Break – Student Life Center & Featheringill-Jacobs Hall
9:45am – 11:30am	EMI Sessions / PMC Sessions
11:30am – 1:00pm	Lunch – Rand Dining Hall
1:00pm – 2:00pm	Plenary Lecture – Student Life Center, Ballroom
2:15pm – 3:45pm	EMI Sessions / PMC Sessions
3:45pm – 4:15pm	Refreshment Break – Featheringill-Jacobs Hall
4:15pm – 5:45pm	EMI Sessions / PMC Sessions
5:00pm – 6:30pm	Student Poster Competition Session – Featheringill-Jacobs Hall
6:30pm – 9:00pm	Reception – Student Life Center Courtyard

Tuesday, May 24, 2016

7:30am – 5:30pm	Registration – Student Life Center / Featheringill-Jacobs Hall
7:30am – 8:00am	Coffee/Breakfast – Student Life Center
8:00am – 9:00am	Plenary Lecture – Student Life Center, Ballroom
9:00am – 9:30am	Coffee Break – Student Life Center & Featheringill-Jacobs Hall
9:30am – 11:30am	EMI Sessions / PMC Sessions
11:30am – 1:00pm	Lunch – Rand Dining Hall
11:30am – 1:00pm	Student Paper Competition Session – Rand Hall & Sarratt Student Center
1:00pm – 2:00pm	Plenary Lecture – Student Life Center, Ballroom
2:15pm – 3:45pm	EMI Sessions / PMC Sessions
3:45pm – 4:15pm	Refreshment Break – Featheringill-Jacobs Hall
4:15pm – 5:45pm	EMI Sessions / PMC Sessions
6:00pm – 9:30pm	Banquet – Student Life Center, Ballroom

Wednesday, May 25, 2016

7:30am – 3:45pm	Registration – Student Life Center / Featheringill-Jacobs Hall
7:30am – 8:00am	Coffee/Breakfast – Student Life Center
8:00am – 9:00am	Plenary Lecture – Student Life Center, Ballroom
9:00am – 9:30am	Coffee Break – Student Life Center & Featheringill-Jacobs Hall
9:30am – 11:30am	EMI Sessions / PMC Sessions
11:30am – 1:00pm	Lunch – Rand Dining Hall
1:00pm – 2:00pm	Plenary Lecture – Student Life Center, Ballroom
2:15pm – 3:45pm	EMI Sessions / PMC Sessions

WELCOME FROM THE CONFERENCE CO-CHAIRS

Prof. Sankaran Mahadevan
Vanderbilt University

Prof. Çağlar Oskay
Vanderbilt University

On behalf of the Local Organizing Committee and the International Scientific Committees, we welcome you to the beautiful campus of Vanderbilt University, site of the annual Engineering Mechanics Institute Conference 2016 (EMI 2016) and the quadrennial Probabilistic Mechanics & Reliability Conference 2016 (PMC 2016). These two conferences come in the wake of exciting new developments in the Vanderbilt School of Engineering, such as construction of the new Engineering and Science Building, and establishment of the Laboratory for Systems Integrity and Reliability (LASIR) and the Multiscale Modeling and Simulation (MuMS) facility.

EMI 2016 and PMC 2016 together feature about 600 presentations in 60 mini-symposia, organized in parallel technical sessions. The number of attendees represents nearly one-third of the total EMI membership. The participants come from over 20 countries, making this event truly international. Equally impressive is the number of student participants, nearly 35% of them from all over the world. In addition to plenary lectures by six distinguished research leaders, several large mini-symposia will start with keynote presentations by leading researchers in the mini-symposia topics. Two panel sessions are organized within PMC 2016, highlighting opportunities and challenges in practical applications, as well as infrastructure resilience, a topic of emerging national attention. In addition, two short courses are offered as part of the conferences.

We wish to thank many individuals who worked hard to put all the important components of the two conferences in place. At the top of the list is Ms. Charity Backs, who coordinated and tirelessly worked on every aspect of the conference. Ms. Karen Page, Ms. Olivia Sequerth, our graduate students and staff volunteers made numerous contributions to the logistics of the conferences. The strong support from the EMI Technical Committees was responsible for the large number of mini-symposia submitted, and we thank the mini-symposia organizers and presenters for the excellent technical program. Dr. Amar Chaker (EMI) and Ms. Verna Jameson (EMI) provided valuable advice throughout the planning. We are grateful to Prof. Philippe Fauchet, Dean of the School of Engineering, and Prof. Douglas Adams, Chair of the Department of Civil & Environmental Engineering, for their strong support of the conferences and for providing valuable resources for their success. We also thank the ASCE Infrastructure Resilience Division, ASCE Structural Engineering Institute, and the U.S. Association for Computational Mechanics for co-sponsoring the conferences and helping with the publicity.

We are excited and honored to welcome you to Vanderbilt University. We hope that the two conferences will be intellectually rewarding and socially enjoyable to all of you.

Enjoy the vibrant Vanderbilt campus and the exciting city of Nashville -- “Music City U.S.A.”!!
WELCOME!!

Sankaran Mahadevan and Çağlar Oskay
Co-Chairs, EMI 2016 and PMC 2016

WELCOME FROM THE EMI PRESIDENT

Professor J. S. Chen
University of California, San Diego

Dear Participants of EMI 2016 and PMC 2016,

As I complete my first year of service as President of EMI, I express my sincere thanks to the dedication and hard work of the Board of Governors, the EMI staff, the technical committees and our members from around the globe.

On behalf of EMI, I thank Professors Sankaran Mahadevan and Çağlar Oskay, their colleagues, and Vanderbilt University for hosting this year's EMI Annual Conference and the quadrennial Probabilistic Mechanics & Reliability Conference, which are reaching new heights, with over 650 participants. The ever-increasing attendance at the EMI events reflects EMI's growing reputation as the premier venue for mechanics. In addition to the vibrant technical programs offered over the past eight years at EMI conferences, our Institute has experienced a healthy increase in its membership and the publication of the well-regarded ASCE Journal of Engineering Mechanics and the ASCE Journal of Nanomechanics and Micromechanics.

I invite you to get more involved with our institute. EMI will grow only through your participation. Opportunities for engagement include the delivery of webinars, publication in ASCE Journal of Engineering Mechanics, ASCE Journal of Nanomechanics and Micromechanics, and the Lecture Notes in Mechanics series, active participation on committees, organization of conference sessions, and engagement in the EMI-industry collaboration.

I wish you an enjoyable and productive conference, and look forward to seeing you next year in San Diego, California, where EMI will be celebrating its tenth anniversary.

Yours truly,

J.S. Chen, Ph.D., F.EMI, M.ASCE

LOCAL ORGANIZING COMMITTEE
VANDERBILT UNIVERSITY
Sankaran Mahadevan, Civil & Environmental Engineering, Vanderbilt University
Çağlar Oskay, Civil & Environmental Engineering, Vanderbilt University
Douglas Adams, Civil & Environmental Engineering, Vanderbilt University
Hiba Baroud, Civil & Environmental Engineering, Vanderbilt University
Prodyot K. Basu, Civil & Environmental Engineering, Vanderbilt University
Ravindra Duddu, Civil & Environmental Engineering, Vanderbilt University
Sanjiv Gokhale, Civil & Environmental Engineering, Vanderbilt University
Haoxiang Luo, Mechanical Engineering, Vanderbilt University
Florence Sanchez, Civil & Environmental Engineering, Vanderbilt University

ADMINISTRATIVE STAFF
VANDERBILT UNIVERSITY
Charity (Hasty) Backs, Civil & Environmental Engineering, Vanderbilt University
Karen Page, Civil & Environmental Engineering, Vanderbilt University
Olivia Sequerth, Civil & Environmental Engineering, Vanderbilt University
Brandis Blodgett, Office of Conferences, Vanderbilt University
Jessica Posey, Office of Conferences, Vanderbilt University
Karen Burnett, Reservations & Events, Vanderbilt University
Lewis Saettel, Building Manager, School of Engineering, Vanderbilt University
Andrew Casey, Information Technology, Vanderbilt University
Barbara Sieger, Catering, Vanderbilt University
Mark Rossi, Rand Dining Center, Vanderbilt University
Michael Ferral, Rand Dining Center, Vanderbilt University

INTERNATIONAL SCIENTIFIC COMMITTEE – EMI 2016
Jose Andrade, California Institute of Technology
Sanjay Arwade, University of Massachusetts Amherst
Roberto Ballarini, University of Houston
Zdeněk Bažant, Northwestern University
Yuri Bazilevs, University of California, San Diego
Markus Buehler, Massachusetts Institute of Technology
Noel Challamel, Université de Bretagne - Sud
J. S. Chen, University of California, San Diego
Gianluca Cusatis, Northwestern University
George Deodatis, Columbia University
C. Armando Duarte, University of Illinois at Urbana-Champaign
Jacob Fish, Columbia University
John Foster, University of Texas, Austin
Dan Frangopol, Lehigh University
Roger Ghanem, University of Southern California
Somnath Ghosh, Johns Hopkins University
Lori Graham-Brady, Johns Hopkins University
Muhammad Hajj, Virginia Tech
Christian Hellmich, Technische Universität Wien, Austria
Ahsan Kareem, University of Notre Dame
Sinan Keten, Northwestern University

Yongming Liu, Arizona State University
Ning Lu, Colorado School of Mines
Jerome P. Lynch, University of Michigan
Sankaran Mahadevan, Vanderbilt University
Majid Manzari, George Washington University
Arif Masud, University of Illinois at Urbana-Champaign
Karel Matouš, University of Notre Dame
Çağlar Oskay, Vanderbilt University
Harold Park, Boston University
Glaucio Paulino, Georgia Tech
Arun Prakash, Purdue University
Nima Rahbar, Worcester Polytechnic Institute
Richard Regueiro, University of Colorado, Boulder
Anthony Rosato, New Jersey Institute of Technology
Andrew Smyth, Columbia University
Lizhi Sun, University of California, Irvine
Ertuğrul Taciroğlu, University of California, Los Angeles
Vikas Tomar, Purdue University
George Voyiadjis, Louisiana State University
Haim Waisman, Columbia University
Huiming Yin, Columbia University
Zhanping You, Michigan Technological University
Mourad Zeghal, Rensselaer Polytechnic Institute

INTERNATIONAL SCIENTIFIC COMMITTEE – PMC 2016
Siu-Kui (Ivan) Au, Nanyang Technology University
Sanjay R. Arwade, University of MA Amherst
Bilal Ayyub, University of Maryland
Jack W. Baker, Stanford University
Michele Barbato, Louisiana State University & A&M College
Hiba Baroud, Vanderbilt University
Baidurya Bhattacharya, Indian Institute of Technology, Kharagpur
Paolo Bocchini, Lehigh University
Luca Caracoglia, Northeastern University
Eleni Chatzi, ETH-Zurich
Ross B. Corotis, University Of Colorado
Sonjoy Das, University at Buffalo
Georgios Deodatis, Columbia University
Armen Der Kiureghian, University Of Calif at Berkeley
Mario DiPaola, University of Palermo
Alireza Doostan, University of Colorado
Bruce R. Ellingwood, Colorado State University
Richard V. Field, Sandia National Laboratories
Dan M. Frangopol, Lehigh University
Paolo Gardoni, University of Illinois at Urbana-Champaign
Roger G. Ghanem, University of Southern California
Lori L Graham-Brady, Johns Hopkins University
Mircea D. Grigoriu, Cornell University

Achintya Haldar, University of Arizona
Terje Haukaas, University of British Columbia
Eric Hernandez, University of Vermont
Luc J. Huyse, Southwest Research Institute
Mehdi Jalalpour, Johns Hopkins University
Erik A. Johnson, University of Southern California
Ahsan Kareem, University of Notre Dame
Ioannis Kougiomtzoglou, Columbia University
Jia-Liang Le, University of Minnesota
Yongming Liu, Arizona State University
Arghavan Louhghalam, Massachusetts Institute of Technology
Sankaran Mahadevan, Vanderbilt University
Marc P. Mignolet, Arizona State University
Babak Moaveni, Tufts University
Mehdi Modares, Illinois Institute of Technology
Arvid Naess, Norwegian University of Science and Technnology
Çağlar Oskay, Vanderbilt University
Martin Ostoja-Starszewski, University of Illinois at Urbana-Champaign
Costas Papadimitrou, University of Thessaly
Konstantinos Papadimitriou, University of Thessaly
Antonina Pirrotta, Universita di Palermo
Shankar Sankararaman, SGT Inc., NASA Ames Research Center
Abhijit Sarkar, Carleton University
Kallol Sett, University at Buffalo
Michael D. Shields, Johns Hopkins University
Junho Song, Seoul National University
Pol Spanos, Rice University
Daniel B. Straub, Technical University of Munich
Bruno Sudret, ETH-Zurich
Alexandros A. Taflanidis, University of Notre Dame
Kirubel Teferra, U.S. Naval Research Laboratory
Iris Tien, Georgia Tech
Mazdak P. Tootkaboni, University of Massachusetts, Dartmouth
Steven F. Wojtkiewicz, Jr., Clarkson University

2016 EMI BOARD OF GOVERNORS
Jiun-Shyan Chen, University of California, San Diego
Jose E. Andrade, California Institute of Technology
Roberto Ballarini, University of Houston
George Deodatis, Columbia University
Raymond Daddazio, Thornton Tomasetti
Muhammad R Hajj, Virginia Tech
Ning Lu, Colorado School of Mines
Glaucio H. Paulino, Georgia Institute of Technology

CONFERENCE LOGISTICS

All conference activities will be held on the Vanderbilt University campus. Please consult the abbreviated maps on pages 2 and 3 of this booklet for the locations of the various conference activities. Please wear your conference name badge for admission to all events.

Registration. Pre-registered participants may pick up their conference bags and badges during the Ice Breaker Reception on May 22, 2016, from 5:30pm to 7:00pm at the Stevenson Center Courtyard. During May 23-25, 2016, the registration desk will be located at the Student Life Center 7:30am – 8:30am, and on the first floor of Featheringill-Jacobs Hall from 9:00am – 5:30pm.

Conference Venue. Plenary lectures will be held in the Student Life Center (Ballroom). Parallel technical sessions will be held in Featheringill-Jacobs Hall, Buttrick Hall, and Stevenson Center (buildings 4 & 5) on the Vanderbilt University campus.

Breakfast. Continental breakfast will be served in the Student Life Center on Monday, Tuesday and Wednesday starting at 7:30am.

Lunch. Lunch will be served on Monday, Tuesday and Wednesday from 11:30am to 1:00pm in Rand Dining Hall. The conference participants will be provided lunch vouchers in the registration packets.

Breaks. Refreshment breaks will be served in the mornings and afternoons of Monday and Tuesday, and in the morning on Wednesday in the Student Life Center and Featheringill-Jacobs Hall. The timings are indicated in the technical program.

Internet Access. Wireless Internet access is available at no additional cost to all conference attendees. Please connect to “vummiv”. This will need to be added under “network connections” as it is a hidden network. The security type is no authentication (open), i.e., no password is required; and encryption type is none.

Speaker Prep Room. Featheringill-Jacobs Hall 129 will be available for speaker preparation 9:00am – 3:00pm on Monday and Tuesday, and 9:00am – 11:00am on Wednesday. Please do not leave any valuables in the Speaker Room, since it is not a secure room.

Committee Meetings. Committee meetings will be held in Featheringill-Jacobs Hall. Detailed schedule for times and locations of the committee meetings will be available online.

Student Competitions. The paper presentation competitions will be held on Tuesday, May 24, 2016, in Rand Hall and Sarrat Student Center. See next page for specific timings and room numbers. The student poster competition will be held Monday, May 23 from 5:00pm – 6:30pm in the Featheringill-Jacobs Hall Atrium.

Emergencies. Dial 911 or 615-421-1911 for campus security and emergency.

EMI 2016 STUDENT COMPETITIONS

Several EMI technical committees are sponsoring student paper competitions or poster competitions.
Student Competitions Chair: Prof. Ravindra Duddu, Vanderbilt University

Meeting times and places for these competitions are as follows.

EMI Computational Mechanics Committee Student Poster Competition
Poster Session: Monday, May 23, 2016, 5:00 pm – 6:30 pm
Location: Featheringill-Jacobs Hall Atrium
Chair: Prof. Ertugrul Taciroglu, University of California, Los Angeles

EMI Dynamics Committee Student Paper Competition
Paper Presentations by Finalists: Tuesday, May 24, 2016, 11:30 am – 1:00 pm
Location: Sarratt 331
Chair: Prof. Siu-Kui (Ivan) Au, University of Liverpool

EMI Granular Materials Technical Committee Student Poster Competition
Poster Session: Monday, May 23, 2016, 5:00 pm – 6:30 pm
Location: Featheringill-Jacobs Hall Atrium
Chair: Prof. Anthony Rosato, New Jersey Institute of Technology

EMI Modeling Inelasticity & Multiscale Behavior (MIMB) Committee Student Paper Competition
Paper Presentations by Finalists: Tuesday, May 24, 2016, 11:30 am – 1:00 pm
Location: Sarratt 325
Chair: Prof. Caglar Oskay, Vanderbilt University

EMI Structural Health Monitoring and Control Committee Student Paper Competition
Paper Presentations by Finalists: Tuesday, May 24, 2016, 11:30 am – 1:00 pm
Location: Rand 308
Chair: Prof. Babak Moaveni, Tufts University

PMC 2016 STUDENT COMPETITION

EMI Probabilistic Methods Committee Student Paper Competition
Paper Presentations by Finalists: Tuesday, May 24, 2016, 11:00 am – 1:00 pm
Location: Sarratt 220
Chair: Prof. Alexandos Taflanidis, University of Notre Dame

PLACES TO SEE ON CAMPUS

Kirkland Hall. Kirkland Hall is an administration building. It houses the office of the Chancellor, the College of Arts and Science, the Graduate School, and other administrative offices. Kirkland Hall is one of the original buildings on campus, though a fire destroyed a great deal of the building in 1905. Before the fire, the library had been housed in Kirkland Hall. With help from students, 4,000 volumes were saved. The Clock Tower Bell rings on the hour. The statue of Commodore Cornelius Vanderbilt is located on the lawn in front of Kirkland, near West End Avenue. In 1873, he donated one million dollars, with the encouragement of Bishop Holland McTyeire, to found the University. The first class at Vanderbilt was comprised of 307 students, and tuition was $35.

Benson, Calhoun, Garland, and Furman. Standing in the circle between Benson and Furman, you can see all four of these buildings. Benson houses the History and English departments; Calhoun houses Economics, Communications, and Political Science; Garland houses Anthropology, Sociology, Religious Studies, and Women and Gender Studies; and Furman houses the Humanities departments including Foreign Languages, Classical Studies, and Philosophy. Behind Benson Hall, in between Benson and Rand, is Bicentennial Oak, an oak tree which predates the Revolutionary War. Vanderbilt is a nationally recognized arboretum and has every tree indigenous to the State of Tennessee represented on the University's 330-acre campus.

Library Lawn / Jean and Alexander Heard Library. The Jean and Alexander Heard Library is the central library on campus. There are seven additional libraries on campus: Anne Potter Wilson Music Library, Peabody Library, Eskind Biomedical Library, Sarah Shannon Stevenson Science Library, Walker Management Library, Alyne Queener Massey Law Library, and Divinity Library. The Special Collections and Television News archives can also be accessed through the library system. The Vanderbilt library system has more than 2 million bound volumes and subscribes to 17,450 periodicals. A statue of George Vanderbilt, Chancellor and grandson of the University founder, Cornelius Vanderbilt, overlooks the library lawn.

Neely Auditorium. A prominent fixture on Alumni Lawn, Neely Auditorium is home to Vanderbilt's Department of Theatre and its student producing organization, Vanderbilt University Theatre. Neely was built in 1925 as a campus chapel and central meeting Neelyhall. Aisles of pews lined the original space, providing seating for chapel service, courses in Western Civilization, and commencement ceremonies. One of the original pews now lives in Neely's lobby, a reminder of the building's history. But once inside, today's students find a modern performance space that serves as classroom during the day, as rehearsal space at night, and as performance venue once we open our shows. Architects gutted the hall in 1976 and designed an open, black box theatre. The flexibility of Neely Auditorium is its strength; as a large space with movable seating risers, Neely offers designers a range of options for stage arrangement. We can stage an Elizabethan comedy in the traditional three-sided thrust arrangement of Shakespeare's Globe Theatre or stage it arena style with spectators on all sides. We can surround the audience with spectacle or minimize scenery to the barest essentials, letting the actors define the space. Each performance features a new arrangement, helping students explore the variables of theatrical space as they also learn to act, construct scenery, design lighting, manage rehearsals, and produce performance for a public audience.

Peabody Mall and Wyatt Center. The Peabody college campus has a classical appeal that owes to having been conceived as a whole between the years of 1911 and 1914. The architects, inspired by Thomas Jefferson's University of Virginia, placed dignified structures across from each other on a vast, open mall. The entire campus was placed on the National Register of Historic Places. It is the largest of the three large lawns of Vanderbilt's campus. The front-most portion is referred to as Magnolia Lawn and is the site of the Peabody College and Graduate School commencement exercises. Anchoring the Peabody Mall on the southeast is the magnificent Faye and Joe B. Wyatt center. Originally named and still inscribed as the Social-Religious Building, it singularly dominates the Peabody campus with its white dome and 10 columns. Built in 1915 as a student center, the structure featured meeting parlors, a ballroom with a glass-enclosed dome, a swimming pool, and a gym. The building was renovated in 1993-1994, preserving its beauty while supporting its transformation from a historic landmark to one of the nation's most advanced learning environments.

Old Mechanical. Though built in 1982, Management Hall, like other buildings on campus, connects to a much older, carefully preserved structure – in this case, Mechanical Engineering Hall, built nearly a century earlier (1888) and now the home of the Owen Graduate School of Management's Executive MBA program. The façade of this Victorian building features details of engineering symbols that are a reminder of its earlier life as home to Vanderbilt's engineering program – the first building in Tennessee designed for teaching engineering. Old Mechanical is one of four Vanderbilt entries in the National Register of Historic Places.

SOCIAL EVENTS

Admission to all social events except the conference banquet is included with your conference registration fee. Banquet tickets are included only for full registration but can also be purchased separately. Your name badge is required for admission to all events.

Sunday, May 22 – Ice Breaker Reception
6:00pm – 8:00pm
Stevenson Center Courtyard
Rain Location: Featheringill-Jacobs Hall Atrium

Get to know the conference venue and meet your fellow EMI 2016 and PMC 2016 participants. Enjoy a casual drink and some light snacks and collect your registration package.

Monday, May 23 – Welcome Reception
6:30pm – 9:00pm
Student Life Center Courtyard
Rain Location: Student Life Center, Ballroom

Meet your fellow EMI 2016 and PMC 2016 participants. Enjoy casual drinks, snacks and a special music presentation.

Tuesday, May 24 – EMI and PMC Conference Awards Banquet
6:00pm – 9:00pm
Student Life Center, Ballroom

For full registrations only (or separate ticket required). Join us in congratulating this year's award winners!

SHORT COURSES

Theory & Practice of the Generalized/eXtended Finite Element Method

C. Armando Duarte
University of Illinois
at Urbana-Champaign

Angelo Simone
Delft University of
Technology

Sunday, May 22, 2016
9:00am – 4:00pm, Featheringill-Jacobs Hall 209

Course Abstract:
The Generalized or eXtended Finite Element Method (G/XFEM) has received increased attention and undergone substantial development during the last decade. This method offers unprecedented flexibility in the construction of shape functions and corresponding approximation spaces. With the proper selection of enrichment functions, the G/XFEM is able to address many shortcoming and limitations of the classical FEM while retaining its attractive features. This short course will introduce participants to the approximation theory of G/XFEM and its formulation for three-dimensional fractures, polycrystalline and fiber-reinforced materials. The implementation of the G/XFEM in an existing FEM software is discussed. Recent developments such as the Stable Generalized FEM (SGFEM) and GFEMs for problems with multiple spatial scales of interest (GFEMgl) are also presented. Representative implementations of the G/XFEM in MATLAB illustrating the performance and practical aspects of the method will be discussed.

Bayesian Model Updating and Uncertainty Quantification: Theory, Computational Tools, and Applications

Babak Moaveni
Tufts University

Costas Papadimitriou
University of Thessaly

Sunday, May 22, 2016
9:00am – 4:00pm, Featheringill-Jacobs Hall 313

Course Abstract:
In simulations of complex physical systems, uncertainties arise from imperfections in the mathematical models introduced to represent the systems and their interactions with the environment. Such uncertainties lead to significant uncertainties in the predictions using simulations. Since such predictions form the basis for making decisions, the knowledge of these uncertainties is very important. The course will present the Bayesian model updating framework, the associated computational tools, and selected applications, along with the main challenges for quantifying and propagating uncertainties in complex structural dynamic simulations.

LIST OF EMI 2016 MINISYMPOSIA

EMI-MS-01: Structural Identification and Damage Detection
Sponsored by: EMI Dynamics Committee & EMI Structural Control and Health Monitoring Committee
Eleni Chatzi, Costas Papadimitriou, Siu-Kui Au

EMI-MS-02: Stability and Failure of Structures and Materials
Sponsored by: EMI Stability Committee
Jifeng Xu, Ahmer Wadee, Yang Xiang

EMI-MS-03: Robustness of Infrastructures (Progressive Collapse)
George Deodatis, Simos Gerasimidis

EMI-MS-04: Multiscale Behavior of Damage and Failure Mechanics
Sponsored by: EMI Technical Committee on Nanomechanics and Micromechanics
Lizhi Sun, J. Woody Ju, George Z. Voyiadjis, Glaucio H. Paulino

EMI-MS-05: Second Symposium on Molecular Scale Modeling and Experimentation
Dinesh Katti, Sinan Keten, Nima Rahbar, Rouzbeh Shahsavari, Kalpana Katti, Steve Cranford

EMI-MS-07: Blast and Ballistic Impact Resistance of Materials and Structures
Prodyot K. Basu, William F. Heard

EMI-MS-08: Modeling Time-Dependent Behavior and Deterioration of Concrete
Roman Wendner, Mohammed Alnaggar, Giovanni Di Luzio, Gianluca Cusatis

EMI-MS-09: Cementitious Materials: Experiments and Modeling Across the Scales
Sponsored by: Properties of Materials Committee
Bernhard Pichler, Christian Hellmich, Günther Meschke, Ruhr University, Gilles Pijaudier-Cabot, Franz-Josef Ulm

EMI-MS-10: Modeling and Characterization of Quasibrittle Fracture
Jia-Liang Le, Qiang Yu, Sze Dai Pang

EMI-MS-11: Multiscale Mechanics of Bio-Inspired and Biological Materials
Sponsored by: EMI Biomechanics and Nanomechncis and Micromechanics Committee
Nima Rahbar, Steven Cranford

EMI-MS-12: 15th Symposium on Biological and Biologically Inspired Materials and Structures
Sponsored by: Biomechanics Committee, Properties of Materials Committee & Poromechanics Committee
Dinesh R. Katti, Christian Hellmich

EMI-MS-13: Computational Solids and Structural Mechanics: Theoretical and Numerical Applications
Sponsored by: EMI Modeling Inelasticity and Multiscale Behavior Committee
Farid Abed, George Voyiadjis, Alexis Rusinek

EMI-MS-14: Advances in Experimental, Theoretical and Computational Fracture Mechanics
Sponsored by: EMI Modeling Inelasticity and Multiscale Behavior Committee
Ange-Therese Akono, Haim Waisman, Huiming Yin, Roberto Ballarini, Christian Linder

EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics
Sponsored by: EMI Computational Mechanics Committee
Timothy Truster, C. Armando Duarte, Çağlar Oskay, Ertuğrul Taciroğlu, Haim Waisman

EMI-MS-16: Multiphysics and Multiscale Modeling of Engineering Materials
Sponsored by: EMI Modeling Inelasticity and Multiscale Behavior Committee
Dr. Chung R. Song, Dr. Yong-Rak Kim, Dr. Ahmed Al-Ostaz

EMI-MS-17: Modeling the Mechanics of Material Surfaces and Interfaces
Chandrasekhar Annavarapu, Timothy Truster, Ravindra Duddu

EMI-MS-18: High-Performance Infrastructure through Nano- and Microstructured Materials
Marcus Rutner

EMI-MS-19: Computational Geomechanics
Steve WaiChing Sun, Qiushi Chen, Xiayu Song, Joshua White, Richard Regueiro, Jose Andrade, Majid Manzari, Ronaldo Borja

EMI-MS-20: Computational Geomechanics for Subsurface Energy Resources Exploitation
Sponsored by: Poromechanics Committee
Shunde Yin, Patrick Selvadurai

EMI-MS-21: Fluid-Dependent Mechanics of Porous Materials: A Focus on the Nanoscale
Sponsored by: Poromechanics Committee & Properties of Materials Committee
Enrico Masoero, Matthieu Vandamme, Mathieu Bauchy, Benoit Coasne, Sinan Keten, Claire White, MJ Abdolhosseini Qomi

EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling
Anthony Rosato, Guiseppe Buscarnera, Matthew R. Kuhn, Mourad Zeghal, Jean-Noel Roux

EMI-MS-23: Pavement Mechanics and Materials
Sponsored by: Committee of Pavement Mechanics
Zhanping You, Yong-Rak Kim, Linbing Wang

EMI-MS-24: Advanced Analysis for Earthquake Engineering
Sponsored by: Dynamics Committee
Steven McCabe, Ting Lin, Kevin Wong

EMI-MS-25: Advances in Base Isolation
Dimitrios Konstantinidis, Nicos Makris

EMI-MS-26: Recent Advances in Rocking Isolation
Nicos Makris, Dimitrios Konstantinidis

EMI-MS-27: Advances and Applications of Elasticity within Applied Mechanics
Sponsored by: Elasticity Committee
Euclides Mesquita, Sonia Mogilevskaya, John Brigham

EMI-MS-28: Fluid Dynamics in Natural Hazards
Sponsored by: Fluid Dynamics Committee
Aly Mousaad Aly, Elena Dragomirescu

EMI-MS-29: Modeling and Mitigation of Coastal Hazards
Sponsored by: Fluid Dynamics Committee
Qin Chen, James Kaihatu

EMI-MS-30: Computational Methods and Applications for Fluid-Structure Interactions
Sponsored by: Fluid Dynamics Committee
Ning Zhang, Shaolin Mao

EMI-MS-31: High-Performance Computing (HPC) Applications in Riverine, Coastal, and Ocean Engineering
Sponsored by: Fluid Dynamics Committee
Celalettin Emre Özdemir

EMI-MS-32: Topology Optimization; Algorithms and Applications
Sponsored by: Computational Mechanics Committee & Probabilistic Mechanics Committee
Mazdak Tootkaboni, Mehdi Jalalpour, James K. Guest

EMI-MS-33: Cyber Physical Infrastructure
Mourad Zeghal, Çağlar Oskay, Tarek Abdoun, Raimondo Betti

EMI-MS-34: Infrastructure System Integrity through Next-Generation Automated Sensing, Damage Diagnosis and Prognosis
Marcus Rutner

EMI-MS-36: Analytical and Experimental Investigations on Resilient Critical Infrastructure under Multiple Hazards
Sponsored by: Experimental Analysis and Instrumentation Committee
Suren Chen, Asad Esmaeily, Yunping Xi

EMI-MS-37: Computational Modeling in Civil Engineering
Pedro Arduino, Andre Barbosa, Joel Conte, Payman Khalili-Tehrani, Ertuğrul Taciroğlu, Farzin Zareian

EMI-MS-38: Quantitative Engineering Sustainability: Model development and Data Analytics
Arghavan Louhghalam, Franz-Josef Ulm, Roger Ghanem, Marta Gonzalez, Ram Rajagopal

EMI-MS-39: Modeling of Grain Boundaries and Grain Boundary-Driven Mechanics
Brandon Runnels, Irene Beyerlein

EMI-MS-40: Advanced Numerical Methods in Computational Biomechanics
Ming-Chen Hsu, Martin Ruess, Dominik Schillinger

EMI-MS-41: Inverse Problems for Tomographic Imaging and Remote Sensing Applications in Engineering
Fabio Semperlotti

EMI-MS-43: Recent Advances in Real-time Hybrid Simulation
Sponsored by: Structural Control and Health Monitoring Committee
Wei Song, Richard Christenson

LIST OF PMC 2016 MINISYMPOSIA

PMC-MS-01: Advanced Simulation-Based Approaches to Uncertainty Quantification and Reliability Analysis
Michael D. Shields, Siu-Kui (Ivan) Au

PMC-MS-02: Probabilistic Methods for Fatigue Damage Monitoring, Diagnosis and Prognosis
Eric Hernandez, Yongming Liu, Shankar Sankararaman

PMC-MS-03: Uncertainty Modeling & Propagation Techniques in Stochastic Dynamics
Ioannis A. Kougioumtzoglou, Antonina Pirrotta, Pol D. Spanos, Mario Di Paola

PMC-MS-04: Structural Identification and Damage Detection
Sponsored by: EMI Dynamics Committee & EMI Structrual Control and Health Monitoring Committee
Eleni Chatzi, Costas Papadimitriou, Siu-Kui (Ivan) Au

PMC-MS-06: Model Uncertainty in Multidisciplinary Analyses
Sponsored by: AIAA Non-Deterministic Approaches Technical Committee
Benjamin P. Smarslok

PMC-MS-07: Uncertainty Quantification and Model Verification and Validation in Multiscale Simulation
Yan Wang, Laura Swiler

PMC-MS-08: Earthquake Hazards and Beyond: Opportunities for Integrating Geosciences and Engineering
Ting Lin

PMC-MS-09: Critical Infrastructure Systems Modeling: Risk, Reliability, and Resilience
Sponsored by: Infrastructure Resilience Committee
Hiba Baroud, Bilal Ayyub

PMC-MS-10: Community Resilience in China
Jie Li, Jianjun Qin

PMC-MS-11: Objective Resilience in Engineering Mechanics
Sponsored by: Objective Resilience Committee
Mohammed Ettouney

PMC-MS-12: Advances in Computational Modeling and Uncertainty Quantification for Analysis, Design and Management of Infrastructure Systems
Arash Noshadravan, Hadi Meidani, Dan Frangopol

PMC-MC-13: Quantification and Propagation of Uncertainty in Engineering Modeling and Design
Mehdi Modares, Zissimos Mourelatos

PMC-MS-14: Risk/Reliability-Based and Robust Structural/Topology Optimization of Civil Structures Exposed to Natural and Man-Made Hazards
Seymour MJ Spence, Alexandros Taflanidis

PMC-MS-15: Surrogate Models for Uncertainty Quantification, Reliability/Risk Assessment and Robust Design
Bruno Sudret, Alexandros Taflanidis

PMC-MS-16: Bayesian Methods in Uncertainty Quantification and Probabilistic Engineering Design
Pingfeng Wang, Zhen Hu

PMC-MS-17: Modeling Resilient Infrastructure
Paolo Gardoni, John van de Lindt

PMC-MS-18: System Reliability Effects in Infrastructure Systems
Cristopher D. Moen, Benjamin W. Schafer, Sanjay R. Arwade

PMC-MS-19: Characterization, Simulation, and Modeling of Random Heterogeneous Materials
Lori Graham-Brady, Michael Shields, Johann Guilleminot

Monday, May 23, 2016

8:00am	Welcoming Remarks								
8:15am–9:15am	Plenary Lecture – Student Life Center, Ballroom								
9:15am–9:45am	Coffee Break – Student Life Center & Featheringill-Jacobs Hall								
9:45am–11:30am EMI Sessions	EMI-MS-04	EMI-MS-32	EMI-MS-15	EMI-MS-11 & 12	EMI-MS-23	EMI-MS-33	EMI-MS-22	EMI-MS-37	
	Featheringill-Jacobs 110	Featheringill-Jacobs 132	Featheringill-Jacobs 134	Featheringill-Jacobs 136	Featheringill-Jacobs 138	Featheringill-Jacobs 211	Buttrick Hall 103	Stevenson Center 4309	
9:45am–11:30am PMC Sessions	PMC-MS-10	PMC-MS-03	PMC-MS-07	PMC-MS-01	PMC-MS-15				
	Featheringill-Jacobs 298	Stevenson Center 5306	Stevenson Center 5312	Stevenson Center 5326	Stevenson Center 5211				
11:30am–1:00pm	Lunch – Rand Dining Hall								
1:00pm–2:00pm	Plenary Lecture – Student Life Center, Ballroom								
2:15pm–3:45pm EMI Sessions	EMI-MS-04	EMI-MS-25	EMI-MS-15	EMI-MS-30	EMI-MS-08	EMI-MS-05	EMI-MS-24	EMI-MS-34	EMI-MS-22
	Featheringill-Jacobs 110	Featheringill-Jacobs 132	Featheringill-Jacobs 134	Featheringill-Jacobs 136	Featheringill-Jacobs 138	Featheringill-Jacobs 211	Featheringill-Jacobs 244	Featheringill-Jacobs 298	Buttrick Hall 103
2:15pm–3:45pm PMC Sessions	PMC-MS-04	PMC-MS-03	PMC-MS-16	PMC-MS-01	PMC-MS-15				
	Buttrick Hall 101	Stevenson Center 5306	Stevenson Center 5312	Stevenson Center 5326	Stevenson Center 5211				
3:45pm–4:15pm	Refreshment Break – Featheringill-Jacobs Hall								
4:15pm–5:45pm EMI Sessions	EMI-MS-28	EMI-MS-16	EMI-MS-15	EMI-MS-11 & 12	EMI-MS-08	EMI-MS-05	EMI-MS-24	EMI-MS-01	EMI-MS-20
	Featheringill-Jacobs 110	Featheringill-Jacobs 132	Featheringill-Jacobs 134	Featheringill-Jacobs 136	Featheringill-Jacobs 138	Featheringill-Jacobs 211	Featheringill-Jacobs 244	Buttrick Hall 101	Buttrick Hall 103
4:15pm–5:45pm PMC Session	PMC Panel Session 1 Stevenson Center 4327								
5:00pm–6:30pm	Student Poster Competition Session – Featheringill-Jacobs Hall								
6:30pm–9:00pm	Reception – Student Life Center Courtyard								

PLENARY LECTURE

Spatial and Temporal Multiscale Models for Advancing Integrated Computational Materials Engineering

Somnath Ghosh, Johns Hopkins University
Monday, May 23, 2016
8:15 am – 9:15 am
Student Life Center, Ballroom
Session Chair: C. Armando Duarte, University of Illinois at Urbana-Champaign

Abstract

The Integrated Computational Materials Engineering or ICME initiative entails integration of information across length and time scales for relevant materials phenomena. This talk will present an integration of methods in Computational Mechanics and Computational Materials Science to address the deformation and failure characteristics of polycrystalline metals in various applications. Specifically it will address physics based modeling at different scales along with multi-scale spatial (scale-bridging) and temporal modeling. Materials considered will be Titanium, Magnesium and Aluminum alloys, as well as Nickel base-superalloys. Spatial scales range from atomistic to component levels, depending on the application. Application domains include cyclic loading and address properties such as time and location-dependent ductility and fatigue life.

The talk will begin with methods of 3D virtual image construction and development of statistically equivalent representative volume elements for materials at multiple scales. Subsequently it will discuss a novel system of experimentally validated physics-based crystal plasticity finite element or CPFE models to predict deformation and micro-twinning leading to crack nucleation. It will discuss stabilized element technology for analyzing heterogeneous deformation problems. The CPFE simulations provide a platform to implement physics-based crack evolution criterion that accounts for microstructural inhomogeneity. For crack evolution, a coupled molecular dynamics-continuum model for a crystalline material with an embedded crack will be discussed. A wavelet transformation based multi-time scaling (WATMUS) algorithm for accelerated crystal plasticity finite element simulations will be discussed. The method significantly enhances computational efficiency in comparison with conventional single time scale integration methods.

Biographical Sketch

Professor Somnath Ghosh is the Michael G. Callas Professor in the Department of Civil Engineering and Professor of Mechanical Engineering and Materials Science & Engineering at Johns Hopkins University. He is the founding director of the JHU Center for Integrated Structure-Materials Modeling and Simulation (CISMMS) and the Air Force Center of Excellence in Integrated Materials Modeling (CEIMM). Prof. Ghosh is currently the President of the US Association of Computational Mechanics (2014-2016). He is the 2013 Nathan M. Newmark Medal winner of EMI/ASCE. He is a fellow of seven professional societies, namely EMI, IACM, USACM, ASME, American Academy of Mechanics, American Association for the Advancement of Science, and ASM International.

PLENARY LECTURE

Surrogate Models for Uncertainty Quantification and Reliability Analysis

Bruno Sudret, ETH Zurich
Monday, May 23, 2016
1:00 pm – 2:00 pm
Student Life Center, Ballroom
Session Chair: Laura Swiler, Sandia National Laboratories

Abstract

Taking into account uncertainties in the design of complex industrial systems and civil infrastructures has received much attention in the last decades. Starting from a realistic computational model (a.k.a. simulator) which reproduces the behavior of the considered system to predict its performance, uncertainty quantification aims at modeling the various sources of uncertainty (including natural variability and lack of knowledge) affecting the parameters of the model, propagate these uncertainties through the model and get relevant statistics on the output quantities of interest (e.g. performance indicators). Due to the computational cost of high-fidelity simulators, the use of Monte Carlo methods for uncertainty propagation and reliability analysis is not a viable solution.

In the last decade, surrogate models of various kinds have been developed to bypass this issue. Roughly speaking, a surrogate model is an accurate approximation of a simulator built from a limited number of runs at selected values of the input parameters (the so-called experimental design) and some learning algorithm. In this lecture, an overview of the most efficient surrogate modelling techniques will be given: polynomial chaos expansions (including sparse approaches suitable to high-dimensional problems), Kriging (a.k.a. Gaussian process modelling) and their combination into PC-Kriging. Low-rank tensor approximations will also be introduced. The advantages of the various approaches for sensitivity analysis and reliability will be discussed with examples from structural mechanics and hydrogeology.

Biographical Sketch

Bruno Sudret is a professor of Risk, Safety and Uncertainty Quantification at ETH Zurich (Switzerland) since 2012. His teaching and research interests are computational methods for uncertainty quantification, reliability and sensitivity analysis, Bayesian approaches to calibration and inverse problems and reliability-based design optimization. He promotes the use of generic, non-intrusive uncertainty quantification algorithms applicable to all fields of applied sciences and engineering through the development of the UQLab software.

Prof. Sudret has authored more than 200 publications including 65 journal papers and book chapters. He currently serves in the editorial board of several journals (Reliability Engineering and Systems Safety, ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Sustainable and Resilient Infrastructure). He belonged to the Board of Directors of the International Civil Engineering Risk and Reliability Association (CERRA) from 2007 to 2015. He is a member of the Joint Committee on Structural Safety since 2003.

PARALLEL SESSIONS – MONDAY, MAY 23

PARALLEL SESSIONS 1 – 9:45 AM – 11:30 AM

M-1-1 – EMI-MS-04: Multiscale Behavior of Damage and Failure Mechanics Monday, May 23 – 9:45 AM – 11:30 AM Chairs: Lizhi Sun, Glaucio Paulino	Location: FGH-JH 110

472: Chemo-Poro Elastic Fracture Mechanics of Wellbore Cement Liners: The Role of Eigenstress and Pore Pressure on the Risk of Fracture
Thomas Petersen, Franz-Josef Ulm
9:45 am – 10:00 am

519: A Two-Way Linked Multiscale Model to Analyze and Predict Pavement Damage Performance
Taesun You, Yong-Rak Kim
10:00 am – 10:15 am

630: Polygonal Finite Elements for Finite Elasticity
Heng Chi, Cameron Talischi, Oscar Lopez-Pamies, Glaucio Paulino
10:15 am – 10:30 am

670: Homogenization of Inter-Granular Fracture Towards a Transient Gradient Damage Model
Leong Hien Poh, Gang Sun
10:30 am – 10:45 am

728: Modeling Dynamic Fragmentation of Heterogeneous Structural Materials
David Cereceda, Nitin Daphalapurkar, Lori Graham-Brady
10:45 am – 11:00 am

770: A Comparison of Two Damage-Plasticity Formulations for Concrete Like Materials
Reza Mousavi, Masoud Dehghani Champiri, Kaspar J. Willam
11:00 am – 11:15 am

M-1-2 – EMI-MS-12: 15th Symposium on Biological and Biologically Inspired Materials and Structures 9:45 AM – 11:30 AM Chairs: Christian Hellmich, Kalpana Katti, Claire Morin	Location: FGH-JH 136

607: A Multiscale Micromechanical Model for Soft Collageneous Tissues
Claire Morin, Stéphane Avril, Christian Hellmich
9:45 am – 10:00 am

738: Osteocyte Calcium Response to Mechanical Load Quantified in Live Allograft Biological Systems at Successive Differentiation Stages
Elisa Budyn, Morad Bensidhoum, Samantha Sanders, Patrick Tauc, Eric Schmidt, Nicolas Roubier, Denis Aubry, Eric Deprez, Herve Petite
10:00 am – 10:15 am

195: Cell Response to Static and Cyclic Compression in a Three-Dimensional Matrix
Lijie Yang, Léolène Jean Carrington, Long Wang, Jessica Jackson Abner, Mingfang Ao, Nabil Simaan, Donna Webb, Deyu Li
10:15 am – 10:30 am

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, Pascal Buenzli
10:30 am – 10:45 am

278: Experimental and Numerical Development of Material Constitutive Properties for Marine Mammals
Molly Grear, Michael Motley
10:45 am – 11:00 am

608: Micromechanical Stiffness Estimation of Tissue Engineering Scaffolds Composed of Hydroxyapatite Granules, Considering Bone Regeneration
Stefan Scheiner, Vladimir Komlev, Alexey Gurin, Christian Hellmich
11:00 am – 11: 15 am

643: Bioinspired Infrastructure Materials: The Interaction Between Peptides and Calcium-Silicate-Hydrate
Mahsa Kamali, Ali Ghahremaninezhad
11:15 am – 11:30 am

M-1-3 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics 9:45 AM – 11:30 AM Chair: Timothy Truster	Location: FGH-JH 134

468: *Mini-Symposium Keynote:* Variational Coupling of DG and CG Methods for Local Damage in Multi-Constituent Materials Modeled via Mixture Theory
Arif Masud, Harishanker Gajendran, Pinlei Chen
9:45 am – 10:15 am

70: Computationally Efficient Modeling of Axially Reinforced, Inflatable, Braided Beams and Tori
Andrew Young, William Davids, Andrew Goupee, Joshua Clapp
10:15 am – 10:30 am

97: A Computational-Experimental Framework to Estimate Transport Properties of Multi-Phase Composites
Masoud K. Darabi, Eisa Rahmani, Dallas Little, Eyad Masad
10:30 am – 10:45 am

120: An Atomistic-to-Continuum Approach to Modeling Size Effects in Polymer-Carbon Nanotube Composites
Marcello Malagu', Alexey Lyulin, Elena Benvenuti, Angelo Simone
10:45 am – 11:00am

740: A Multiscale GFEM for Fiber Reinforced Composites
Phillipe Alves, C. Armando Duarte
11:00 am – 11:15 am

336: An Interfacial Model for Mode-I and Mode-II Dynamic Crack Propagation in Rocks with Stick–Slip Contact Transitions
Reza Abedi, Omid Omidi, Robert Haber, Ahmed Elbanna
11:15 am – 11:30 am

M-1-4 – EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling 9:45 AM – 11:30 AM Chairs: A. Douadji, Anil Misra	Location: Buttrick 103

757: *Mini-Symposium Keynote:* Micromorphic Model Including Grain Spins Based Upon Granular Micromechanics
Anil Misra, Payam Poorsolhjouy
9:45 am – 10:15 am

61: Micromechanics of Incremental Stress Probes of a Granular Material
Matthew R. Kuhn
10:15 am – 10:30 am

115: Improvement of Contact Force Model and Failure Criterion of Bonded Dilated Polyhedral Elements
Lu Liu, Shanshan Sun, Shunying Ji
10:30 am – 10:45 am

428: Effect of Particle Shape and Particle Size Ratio on the Packing Density of Very Dense Binary Mixtures
Tang-Tat Ng
10:45 am – 11:00 am

467: Micro-Macro Experimental Study of Remoulded Clayey Materials on Drying Path
Xin Wei, Jean-Marie Fleureau, Mahdia Hattab
11:00 am – 11:15 am

736: Implications of Grain Morphology on the Rheology of Dense Granular Flows
Liuchi Li, José E. Andrade
11:15 am – 11:30 am

M-1-5 – EMI-MS-23: Pavement Mechanics and Materials 9:45 AM – 11:30 AM Chairs: Zhanping You, Yong-Rak Kim	Location: FGH-JH 138

98: Rutting Performance Prediction and Analysis of Airfield Pavements Subjected to Next Generation Aircraft
Masoud K. Darabi, John Rushing, Eisa Rahmani, Rashmi Kola, Dallas Little
9:45 am – 10:00 am

331: Property Analysis of Exfoliated Graphite Nanoplatelets Modified Asphalt Model Using Molecular Dynamics (MD) Method
Hui Yao, Qingli Dai, Zhanping You
10:00 am – 10:15 am

375: Numerical and Experimental Analysis of Geogrid Reinforced Concrete Overlays
George Saad, Hayssam Itani, Ghassan Chehab
10:15 am – 10:30 am

474: A Numerical-Experimental Approach to Characterize Fracture Properties of Fine Aggregate Asphalt Mixtures at Different Temperatures and Loading Rates
Francisco Aragao, Diego Hartmann, Gustavo Badilla-Vargas, Yong Rak Kim
10:30 am – 10:45 am

550: Viscoelastic Characterization of Bituminous Materials through Multiscale Testing-Analysis
Hesamaddin Nabizadeh, Santosh Kommidi, Yong-Rak Kim
10:45 am – 11:00 am

564: Computational Evaluation of the Role of Aggregate Shape Parameters on the Mechanical Performance and Degradation of Asphalt Mixtures
Daniel Castillo, Silvia Caro, Masoud Darabi, Eyad Masad
11:00 am – 11:15 am

566: Semicircular Bend Fracture Test Integrated with Numerical Simulation to Characterize Mixed-Mode Fracture Properties of Asphaltic Materials
Soohyok Im, Hoki Ban, Yong-Rak Kim
11:15 am – 11:30 am

M-1-6 – EMI-MS-32: Topology Optimization; Algorithms and Applications 9:45 AM – 11:30 AM Chairs: Mehdi Jalalpour, Mazdak Tootkaboni	Location: FGH-JH 132

129: *Mini-Symposium Keynote:* Design Optimization of 3-D Woven Micro-Lattice Materials
Seunghyun Ha, James K. Guest
9:45 am – 10:15 am

89: A Lower-Bound Formulation Including Spatial Orientation for Topology Optimization of Modular Truss Structures
Alexis Tugilimana, Ashley Thrall, Benoît Descamps, Rajan Filomeno Coelho
10:15 am – 10:30 am

133: Topology Optimization of Structures Considering Constructability Costs
Saranthip Koh, James K. Guest
10:30 am – 10:45 am

540: A Maximum Filter for the Ground-Structure Method
Emily Daniels, Adeildo Ramos Jr., Glaucio Paulino
10:45 am – 11:00 am

635: A Discrete Filter Scheme for Topology Design with Material Nonlinear Behaviors Using the Ground Structure Method
Xiaojia Zhang, Adeildo Ramos Jr., Glaucio Paulino
11:00 am – 11: 15 am

778: Conceptual Building Design: Density and Ground Structure Topology Optimization Solutions
Igor Torres, Sara Brandão, Sylvia Almeida, Glaucio Paulino
11:15 am – 11:30 am

M-1-7 – EMI-MS-33: Cyber Physical Infrastructure 9:45 AM – 11:30 AM Chairs: Mourad Zeghal, Cağlar Oskay	Location: FGH-JH 211

504: Utility Mapping and Subsurface Structural Assessment with Tri-Band Ground Penetrating Radar
Dryver Huston, Tian Xia, Yu Zhang, Taian Fan
9:45 am – 10:00 am

553: Application of the Trajectory Cluster Analysis for Road Surface Monitoring
Jinwoo Jang, Andrew Smyth
10:00 am – 10:15 am

416: Structure-Invariant Occupant Detection Using Footstep-Induced Structural Vibration
Mostafa Mirshekari, Mike Lam, Pei Zhang, Hae Young Noh
10:15 am – 10:30 am

631: Estimator and Closed-Loop Performance of Wireless Control Systems under Intermittent Observations
Lauren Linderman
10:30 am – 10:45 am

411: 20 Year Old Real-Time Sensor and Management Systems
Chung Song, Dong D. Yoon
10:45 am – 11:00 am

462: Multiscale Monitoring and Health Assessment of Levees
Mourad Zeghal, Abdoun Tarek, Victoria Bennett
11:00 am – 11:15 am

M-1-8 – EMI-MS-37: Computational Modeling in Civil Engineering 9:45 AM – 11:30 AM Chairs: Payman Khalili-Tehrani, Ertuğrul Taciroğlu	Location: SC 4309

768: *Mini-Symposium Keynote:* Numerical Evaluation of Forces on Piled Bridge Foundations in Laterally Spreading Soil
Alborz Ghofrani, Chris McGann, Pedro Arduino
9:45 am – 10:15 am

633: Seismic Soil-Structure Interaction Analysis of Nuclear Power Plants: Time Domain versus Frequency Domain
Payman Khalili-Tehrani, Benjamin Kosbab
10:15 am – 10:30 am

189: Effect of Soil Heterogeneity on Nuclear Facility Soil-Foundation Interaction
Swetha Veeraraghavan, Justin Coleman, Benjamin Spencer
10:30 am – 10:45 am

446: Modeling Kinematic and Inertial Interaction Effects on Buried Structures through Reduced Order Models
Elnaz Esmaeilzadeh Seylabi, Ertuğrul Taciroğlu
10:45 am – 11:00 am

326: Dynamic Interaction of Soil – Structure Cluster
Feng Xiong, Qi Ge
11:00 am – 11:15 am

152: Analytical Studies of a Test Model for Soil-Abutment Interaction under Seismic Loads
Bahareh Abdollahi, M. Saiid Saiidi, Raj V. Siddharthan, Sherif Elfass, Anoosh Shamsabadi
11:15 am – 11:30 am

M-1-9 – PMC-MS-01: Advanced Simulation-Based Approaches to Uncertainty Quantification and Reliability Analysis 9:45 AM – 11:30 AM Chair: Michael Shields	Location: SC 5326

759: *Mini-Symposium Keynote:* Mechanical Systems' Reliability by Enhanced Monte Carlo Simulation
Arvid Naess, H. Svandal Bø
9:45 am – 10:15 am

184: Reliability Evaluation of Large Nonlinear Structures Excited by Dynamic Loadings Applied in Time Domain
Hamoon Azizsoltani, Novonil Sen, Achintya Haldar
10:15 am – 10:30 am

300: Reliability Analysis of Structures Subject to Spatio-Temporal Loading
Harshini Devathi, Zhen Hu, Sankaran Mahadevan
10:30 am – 10:45 am

244: Reliability Assessment with Efficient Sequential Importance Sampling
Iason Papaioannou, Costas Papadimitriou, Daniel Straub
10:45 am – 11:00 am

706: First Order Sampling Approach for Time-Dependent System Reliability Analysis
Zhen Hu, Sankaran Mahadevan
11:00 am – 11:15 am

M-1-10 – PMC-MS-03: Uncertainty Modeling & Propagation Techniques in Stochastic Dynamics 9:45 AM – 11:30 AM Chairs: Ioannis Kougioumtzoglou, Antonina Pirrotta	Location: SC 5306

498: Power Spectral Density Response through Modal Analysis Framed into Analytical Dynamics
Vasileios Fragkoulis, Ioannis Kougioumtzoglou, Athanasios Pantelous, Antonina Pirrotta
9:45 am – 10:00 am

170: Efficient Incremental Dynamic Analysis via Stochastic Averaging
Ketson dos Santos, Ioannis Kougioumtzoglou, André Beck
10:00 am – 10:15 am

507: Temporal Coherence in Turbulent Wind Fields: Modeling and Simulation
Jennifer Rinker, Henri Gavin
10:15 am – 10:30 am

118: A Semi-Analytical Methodology for the Reliability-Based Design of Linear Dampers used for Seismic Hazard Mitigation of Buildings
Michele Barbato, Enrico Tubaldi, Andrea Dall'Asta
10:30 am – 10:45 am

113: Uncertain Seismic Wave Propagation through Uncertain Elastic-Plastic Soils
Fangbo Wang, Kallol Sett
10:45 am – 11:00 am

M-1-11 – PMC-MS-07: Uncertainty Quantification and Model Verification and Validation in Multiscale Simulation 9:45 AM – 11:30 AM Chairs: Yan Wang, Francesca Tavazza	Location: SC 5312

180: Adaptive Selection and Validation of Coarse-Grained Models of Atomistic Systems in the Presence of Uncertainties
Kathryn Farrell-Maupin, J. Tinsley Oden, Danial Faghihi
9:45 am – 10:00 am

191: Uncertainty Quantification of Manufacturing Process Effects on Macro-scale Material Properties
Guowei Cai, Sankaran Mahadevan
10:00 am – 10:15 am

130: Sensitivity Assessment of Interatomic Potentials On-the-fly in Molecular Dynamics Simulation
Anh Tran, Yan Wang
10:15 am – 10:30 am

143: Uncertainty Quantification and Model Verification for Nanoindentation Simulations: a Combined MD and Hybrid MD/FEM Study
Francesca Tavazza, Li Ma, Dilip Banerjee, Lyle Levine
10:30 am – 10:45 am

88: Uncertainty Quantification and Model Verification and Validation in Multiscale Simulation
Paul Braden
10:45 am – 11:00 am

M-1-12 – PMC-MS-10: Community Resilience in China 9:45 AM – 11:30 AM Chairs: Jie Li, Jianjun Qin	Location: FGH-JH 298

209: Numerical Investigation for Bridge Seismic Performance Correlation
Jianjun Qin, Yao Liu
9:45 am – 10:00 am

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, Chen Xiong, Zhen Xu, Xinzheng Lu
10:00 am – 10:15 am

709: Seismic Resilience Assessment of RC Highway Continuous Bridges in China
Dagang Lu, Sheng Xu, Jelena M. Andrić
10:15 am – 10:30 am

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, Zixiang Guan
10:30 am – 10:45 am

399: Resilience of Lifeline Infrastructures
Jianjun Qin, Jie Li
10:45 am – 11:00 am

451: Research on Frequency-Temperature Correlation of Runyang Suspension Bridge during Typhoon Matsa Using Structural Health Monitoring and Finite Element Analysis
Hao Wang, Jianxiao Mao, Zhixiang Xun
11:00 am – 11:15 am

M-1-13 – PMC-MS-15: Surrogate Models for Uncertainty Quantification, Reliability/Risk Assessment and Robust Design 9:45 AM – 11:30 AM Chairs: Alexandros Taflanidis, Bruno Sudret	Location: SC 5211

126: LARS-Based ARX PCE Metamodel for Computing Seismic Fragility Curves
Chu Mai, Minas Spiridonakos, Eleni Chatzi, Bruno Sudret
9:45 am – 10:00 am

168: Adaptive Surrogate Model-Based Stochastic Search Algorithms for Locating Implicitly Defined Limit Surfaces for Structural Reliability Analysis
Sundar V.S., Michael Shields
10:00 am – 10:15 am

8: Adaptive Kriging Metamodeling for Simultaneous Uncertainty-Propagation and Design-Optimization
Jize Zhang, Alexandros Taflanidis
10:15 am – 10:30 am

690: Reliability Assessment of Power Distribution Lines Against Wind Loadings Using an Adaptive Kriging Method
Yousef Mohammadi Darestani, Abdollah Shafieezadeh
10:30 am – 10:45 am

172: Reliability Analysis of Steel Frames under Earthquake Loading Using Meta-Models
Mehdi Rostamian, Adel Abdelnaby
10:45 am – 11:00 am

107: Characterizing the Residual Stress Fields Resulting from Cold Expansion using Gaussian Process Surrogate Models
Eric VanDerHorn, Sankaran Mahadevan
11:00 am – 11:15 am

PARALLEL SESSIONS 2 – 2:15 PM – 3:45 PM

M-2-1 – PMC-MS-04: Structural Identification and Damage Detection 2:15 PM – 3:45 PM Chairs: Eleni Chatzi, Andrew Smyth	Location: Buttrick 101

267: *Mini-Symposium Keynote:* Bayesian Methods for Nonlinear Finite Element Model Updating and Damage Identification of Civil Structures
Rodrigo Astroza, Hamed Ebrahimian, Joel P. Conte
2:15 pm – 2:45 pm

90: Sensor Placement for Structural Health Monitoring: An Optimal Bayesian Experimental Design Approach
Giovanni Capellari, Eleni Chatzi, Stefano Mariani
2:45 pm – 3:00 pm

585: Model Updating of a 10-Story Concrete Building Using Hierarchical Bayesian Framework
Iman Behmanesh, Seyedsina Yousefianmoghadam, Amin Nozari, Babak Moaveni, Andreas Stavridis
3:00 pm – 3:15 pm

697: Exploration of Error Rate Criteria to Decide Bounds for Model Falsification
Subhayan De, Patrick Brewick, Erik Johnson, Steve Wojtkiewicz
3:15 pm – 3:30 pm

288: Dynamic Characterization of Civil Structures Based on the Variational Mode Decomposition Method
Abdollah Bagheri, Osman Özbulut, Devin Harris
3:30 pm – 3:45 pm

95: Online Bayesian Model Assessment for Structural Health Monitoring Using Nonlinear Filters
Thaleia Kontoroupi, Andrew Smyth
3:45 pm – 4:00 pm

M-2-2 – EMI-MS-04: Multiscale Behavior of Damage and Failure Mechanics 2:15 PM – 3:45PM Chairs: Lizhi Sun, Glaucio Paulino	Location: FGH-JH 110

393: Mechanics of Damage, Healing, Damageability, and Integrity of Materials: A Conceptual Framework
George Voyiadjis, Peter Kattan
2:15 pm – 2:30 pm

81: Multi-Scale Modeling of Damage and Failure in S-Glass/Epoxy Fiber Reinforced Composite Subject to High Strain Rate Impact
Zhiye Li, Shinu Baby, Xiaofan Zhang, Somnath Ghosh
2:30 pm – 2:45 pm

323: Micromechanical Damage Model for Mode I Fracture of Fiber Composite under Static Loading
Rudraprasad Bhattacharyya, Çağlar Oskay
2:45 pm – 3:00 pm

508: Interaction of Failure Modes in the Fatigue Life of Laminated Composites
Michael Bogdanor, Çağlar Oskay
3:00 pm – 3:15 pm

775: A Mixed-Mode Rate-Dependent Cohesive Zone Model Using Fractional Viscoelasticity
Oliver Giraldo-Londoño, Glaucio Paulino, William Buttlar
3:15 pm – 3:30 pm

359: Interfacial Debonding and Viscoelastic Behavior of Magnetorheological Nanocomposites
Robbie Damiani, Lizhi Sun
3:30 pm – 3:45 pm

M-2-3 – EMI-MS-05: Second Symposium on Molecular Scale Modeling and Experimentation 2:15 PM – 3:45PM Chairs: Dinesh Katti, Sinan Keten	Location: FGH-JH 211

617: Multiscale Modeling of Scaffolds for Bone Regeneration: Bridging Molecular to Macroscale
Dinesh Katti, Anurag Sharma, Kalpana Katti
2:15 pm – 2:30 pm

625: Evaluation of Coarse Grained Models for Cellulose NanoCrystals (CNCs)
Mehdi Shishehbor, Pablo Zavattieri
2:30 pm – 2:45 pm

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, Zhen Liu, Peng Deng, Shiling Pei
2:45 pm – 3:00 pm

727: Sensitivity of Thermal Conductivity to Force Estimates in Molecular Dynamics Simulations
Greg Walker, Casey Brock, Matthew Gerboth
3:00 pm – 3:15 pm

744: Ergodicity and Linear Response of Thermostats for Single Degree of Freedom Systems: Towards Improved Temperature Control
Puneet Patra, Baidurya Bhattacharya
3:15 pm – 3:30 pm

M-2-4 – EMI-MS-08: Modeling Time-Dependent Behavior and Deterioration of Concrete 2:15 PM – 3:45PM Chairs: Roman Wendner, Gianluca Cusatis	Location: FGH-JH 138

454: A Discrete Hygro-Thermal-Chemo-Mechanical Model for Deterioration of Concrete Structures
Giovanni Di Luzio, Gianluca Cusatis, Xinwei Zhou, Daniele Pelessone
2:15 pm – 2:30 pm

629: Modeling of Aging Effects on Concrete Creep/ Shrinkage Behavior: A Lattice Discrete Particle Modeling Approach
Mohammed Abdelatif, Giannis Boumakis, Roman Wendner, Mohammed Alnaggar
2:30 pm – 2:45 pm

546: Constitutive Models for Mortar of Bonded Anchors
Marco Marcon, Jan Vorel, Roman Wendner
2:45 pm – 3:00 pm

543: Long-Term Deformations of Fastening Systems under Sustained Loads
Roman Wendner, Marco Marcon, Giannis Boumakis
3:00 pm – 3:15 pm

598: Coupled Thermo-Mechanical Behavior of Hydronically-Activated Concrete Structures: Consideration of Material Damage Due to Mechanical Loading and Temperature Cycling
Zhenglai Shen, Hongyu Zhou, Qiuhai Zuo
3:15 pm – 3:30 pm

716: Freezing/Thawing Rate Effects on Concrete Strength with Different Moisture Contents
Christina Sanon, Mohammed Abdelatif, Elsayed Salem, Giovanni Di Luzio, Mohammed Alnaggar
3:30 pm – 3:45 pm

M-2-5 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics 2:15 PM – 3:45 PM Chair: Arturo Montoya	Location: FGH-JH 134

72: Multi-Physics Simulation for a Strain Rosette Made of Slotted Patch Antenna Sensors
Dan Li, Chunhee Cho, Yang Wang
2:15 pm – 2:30 pm

74: Reduced Order Variational Multiscale Enrichment Method for Thermo-Mechanical Problems
Shuhai Zhang, Çağlar Oskay
2:30 pm – 2:45 pm

101: Multi-Time Scale Coupled Transient Electro-Magnetic and Structural Dynamics Finite Element Analysis for Antenna Simulations
Reza Yaghmaie, Shu Guo, Somnath Ghosh
2:45 pm – 3:00 pm

352: A Domain Decomposition Based Pre-conditioner for the Solution of Shear Bands
Luc Berger-Vergiat, Haim Waisman
3:00 pm – 3:15 pm

660: Degradation of Materials and Structures Due to Temperature and Moisture: Semi-Analytical Solutions, Computational Framework, and Numerical Solutions
Can Xu, Kalyana Nakshatrala
3:15 pm – 3:30 pm

691: A Distributed Electro-Conductive Finite Element Method Devoted for Energy-Harvesting and Self-Monitoring Applications on Plate-Like Reinforced Structures
Antonio Velazquez, Munir D. Nazzal, Hajir A. Ali
3:30 pm – 3:45 pm

M-2-6 – EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi- Scale Modeling 2:15 PM – 3:45PM Chairs: Otis Walton, Mourad Zeghal	Location: Buttrick 103

38: Understanding the Effect of Modeling Fidelity of Particle Shapes on Simulation Fidelity of Soil Behavior through 3D Printing
Yu-Feng Su, Bin Zhang, Seung Jae Lee, Beena Sukumaran
2:15 pm – 2:30 pm

198: Advances in Dynamical Simulation and Analysis of Granular Flows
Denis Blackmore, Anthony Rosato
2:30 pm – 2:45 pm

217: Onset of Grain Size Segregation in Bi-Disperse Chute Flow
Lu Jing, Fiona Kwok, Andy Leung
2:45 pm – 3:00 pm

256: Floor Pressures below Dry and Submerged Layered Vertical Granular Columns
Otis Walton, Hubert Vollmer, Victor Hepa
3:00 pm – 3:15 pm

465: Fabric Evolution during Soil Liquefaction
Usama El Shamy, Yasser Abdelhamid
3:15 pm – 3:30 pm

M-2-7 – EMI-MS-24: Advanced Analysis for Earthquake Engineering 2:15 PM – 3:45PM Chairs: Ting Lin, Kevin Wong	Location: FGH-JH 244

310: Structural Response Analysis Using a Novel Predictive Stochastic Ground Motion Model
Christos Vlachos, Konstantinos G. Papakonstantinou, George Deodatis
2:15 pm – 2:30 pm

634: An Enhanced Stochastic Averaging Method for Optimal Control of Structures with Nonlinear Soil-Structure Interactions
Omar El-Khoury, Abdollah Shafieezadeh
2:30 pm – 2:45 pm

685: Effects of Foundation Gapping and Sliding on Seismic Risk of Nuclear Structures
Chandrakanth Bolisetti, Justin Coleman
2:45 pm – 3:00 pm

597: Using Sobol Decomposition in Sensitivity Analysis of Nonlinear Dynamic Behavior of RC Buildings with Viscous Damper
Mohammadreza Moradi, Alireza Moradi
3:00 pm – 3:15 pm

699: Optimal Clipped Linear Strategies for Controllable Damping
Qian Monica Fang, Patrick Brewick, Erik Johnson, Steve Wojtkiewicz
3:15 pm – 3:30 pm

689: Multi-Agent Decentralized Vibration Control of Large Building Structures Using Bio-Inspired Replicator Dynamics
Mariantonieta Gutierrez Soto, Hojjat Adeli
3:30 pm – 3:45 pm

M-2-8 – EMI-MS-25: Advances in Base Isolation 2:15 PM – 3:45PM Chairs: Nicos Makris	Location: FGH-JH 132

548: Coupling Behavior of Shear Deformation and End Rotation of Elastomeric Seismic Isolation Bearings
Ken Ishii, Masaru Kikuchi, Takuya Nishimura, Ian Aiken
2:15 pm – 2:30 pm

196: Multiple Floor Isolation Control System for Integrating Mass Damper and Seismic-Isolation Systems in Buildings
Hamidreza Anajafi Marzijarani, Tat S. Fu
2:30 pm – 2:45 pm

464: Analysis of the Rocking Response of Unrestrained Equipment on Rolling Isolation Systems
P. Scott Harvey Jr, Skylar J Calhoun
2:45 pm – 3:00 pm

490: Gauss's Principle of Least Constraint and Non-holonomic Dynamics
Karah Kelly, Henri Gavin
3:00 pm – 3:15 pm

497: Inelastic Base Shear Reconstruction from Sparse Acceleration Measurements of Buildings
Boya Yin, Henri Gavin
3:15 pm – 3:30 pm

M-2-9 – EMI-MS-30: Computational Methods and Applications for Fluid-Structure Interactions 2:15 PM – 3:45PM Chair: Ning Zhang	Locations: FGH-JH 136

739: Fluid-Structure Interaction Using the Domain Free Discretization (DFD) Method
Yang Zhang, Haoxiang Luo, Chunhua Zhou
2:15 pm – 2:30 pm

32: Three-Dimensional DEM-CFD Coupled Modeling of Gas-Particles Interaction in Supersonic Compressible Flows and Buried Landmine Blast Wave
Beichuan Yan, Richard Regueiro
2:30 pm – 2:45 pm

175: Community-Scale Multi-Fidelity Modeling of Tsunami Forces on Coastal Structures
Xinsheng Qin, Michael Motley, Randall LeVeque, Frank Gonzalez
2:45 pm – 3:00 pm

663: Field and Laboratory Testing of Levee Structures in Southwest Louisiana to Mitigate Storm Surges and Protect the Shoreline
Dimitrios Dermisis, Evan Geerts, Ning Zhang
3:00 pm – 3:15 pm

426: Investigation of the Impacts of Coastal Waves on Erosion of Coastal Structures
Ning Zhang
3:15 pm – 3:30 pm

704: A 2D Fluid-Structure Interaction Method for Modeling the Performance of Resetting Semi-Passive Stiffness Dampers (RSPSD)
Antonio Velazquez, Ken Walsh
3:30 pm—3:45 pm

M-2-10 – EMI-MS-34: Infrastructure System Integrity through Next-Generation Automated Sensing, Damage Diagnosis and Prognosis 2:15 PM – 3:45PM Chairs: Marcus Rutner, Prodyot K. Basu	Location: FGH-JH 298

714: Consequence-Based Management of Railroad Bridges Networks Enabled by Wireless Smart Sensors
Fernando Moreu, Billie Spencer, Douglas Foutch, Sandro Scola
2:15 pm – 2:30 pm

679: Computational and Experimental Testing of Thermo-Chemical Structural Health Monitoring of Composites
Behnoush Golchinfar, Marcus Rutner, Dimitri Donskoy
2:30 pm – 2:45 pm

112: AE Based Damage Detection of Steel Bridge Superstructures
Ozgur Yapar, Prodyot K. Basu
2:45 pm – 3:00 pm

683: Large Coverage, Direct Sensing and Monitoring of Corrosion in Reinforced Concrete Structures
Marcus Rutner, Dimitri Donskoy
3:00 pm – 3:15 pm

M-2-11 – PMC-MS-01: Advanced Simulation-Based Approaches to Uncertainty Quantification and Reliability Analysis 2:15 PM – 3:45 PM Chair: Kirubel Teferra	Location: SC 5326

166: Propagation of Uncertain Probability Distributions Using Bayesian Inference and Importance Sampling
Jiaxin Zhang, Michael Shields
2:15 pm – 2:30 pm

239: A Parallel MCMC Method
Laura Swiler, Jaideep Ray, Maoyi Huang, Jason Hou
2:30 pm – 2:45 pm

334: A New Sample-Based Method to Estimate Global Sensitivity Indices
Chenzhao Li, Sankaran Mahadevan
2:45 pm – 3:00 pm

437: Optimal Approximation of Multi-Variate Stochastic Processes by Functional Quantization
Vasileios Christou, Paolo Bocchini, Manuel Miranda
3:00 pm – 3:15 pm

440: Design of Experiments for Uncertainty Quantification on Sparsly Sampled Discrete Random Functions in Multiple Dimensions
Justin Winokur, Vicente Romero
3:15 pm – 3:30 pm

M-2-12 – PMC-MS-03: Uncertainty Modeling & Propagation Techniques in Stochastic Dynamics 2:15 PM – 3:45 PM Chairs: Ioannis Kougioumtzoglou, Antonina Pirrotta	Location: SC 5306

176: Nonlinear System with Fractional Derivative Terms Parameter Identification Subject to Incomplete Non-Stationary Data
Ioannis Kougioumtzoglou, Ketson dos Santos, Liam Comerford
2:15 pm – 2:30 pm

285: Random Vibration Integrals for Systems Endowed with Fractional Derivative Elements
Pol Spanos, Vasileios Fragkoulis, Ioannis Kougioumtzoglou, Athanasios Pantelous
2:30 pm – 2:45 pm

463: Anomalous Stochastic Resonance Modeled by Fractional Fokker-Planck Equation
Yan Wang
2:45 pm – 3:00 pm

384: Variability Response Functions for Apparent Material Properties in Two-Dimensional Elasticity Problems
Jenny Sideri, Athina Spyridaki, George Deodatis, Sanjay R. Arwade
3:00 pm – 3:15 pm

385: Variability Response Functions for Statically Determinate Beams with Arbitrary Nonlinear Constitutive Laws
Athina Spyridaki, Jenny Sideri, George Deodatis, Sanjay R. Arwade
3:15 pm – 3:30 pm

M-2-13 – PMC-MS-15: Surrogate Models for Uncertainty Quantification, Reliability/Risk Assessment and Robust Design 2:15 PM – 3:45 PM Chairs: Alexandros Taflanidis, Bruno Sudret	Location: SC 5211

261: Gaussian Process Models for Truncated Response Data
John McFarland
2:15 pm – 2:30 pm

93: Limit-State Surrogate Based Reliability Estimation under Uncertainty
Saideep Nannapaneni, Zhen Hu, Sankaran Mahadevan
2:30 pm – 2:45 pm

237: An Adaptive Method for Solving Stochastic Equations Using Local Taylor Approximations and a Posteriori Error Estimates
Wayne Isaac Uy, Mircea Grigoriu
2:45 pm – 3:00 pm

681: A Gradient Based Adaptive Sparse Grid Collocation Method for Uncertainty Quantification
Anindya Bhaduri, Lori Graham-Brady
3:00 pm – 3:15 pm

656: The f-Sensitivity Index
Sharif Rahman
3:15 pm – 3:30 pm

39: Introducing an Algorithm for Training of Neuro-Skin Model
Mehrdad Shafiei Dizaji, Abdolreza Joghataie
3:30 pm – 3:45 pm

M-2-14 – PMC-MS-16: Bayesian Methods in Uncertainty Quantification and Probabilistic Engineering Design 2:15 PM – 3:45 PM Chairs: Daniel Straub, Pingfeng Wang	Location: SC 5312

220: Bayesian Reliability Analysis Using OpenBUGS
Kilian Zwirglmaier, Daniel Straub
2:15 pm – 2:30 pm

307: Reliability Analysis with Linguistic Data: An Evidential Network Approach
Xiaoge Zhang, Sankaran Mahadevan
2:30 pm – 2:45 pm

317: Sparse Bayesian Learning for Failure Prognostics and Uncertainty Management
Pingfeng Wang, Parse Kianpour
2:45 pm – 3:00 pm

669: Full Gibbs Sampling Algorithm for Sparse Damage Detection for the Phase II IASC–ASCE Structural Health Monitoring Experimental Benchmarks
Yong Huang, James Beck
3:00 pm – 3:15 pm

367: Uncertainty Quantification in Manufacturing Process Evaluation
Saideep Nannapaneni, Sankaran Mahadevan, Sudarsan Rachuri
3:15 pm—3:30 pm

PARALLEL SESSIONS 3 – 4:15 PM – 5:45 PM

M-3-1 – EMI-MS-01: Structural Identification and Damage Detection 4:15 PM – 5:45 PM Chairs: Manolis Chatzis, Erik Johnson	Location: Buttrick 101

221: Advanced System Identification for Super High-rise Building Using Shear-Bending Model
Kohei Fujita, Ryuji Koyama, Izuru Takewaki
4:15 pm – 4:30 pm

78: Reconstruction of Acoustic Sources in a Heterogeneous Elastic Solid
Stephen Lloyd, Chanseok Jeong
4:30 pm – 4:45 pm

62: Finite Element Model Updating with Noisy Data through the Modal Dynamic Residual Approach
Xinjun Dong, Yang Wang
4:45 pm – 5:00 pm

516: Modeling the Force-Displacement Behavior of Passive Isolation-Layer Devices in a Four Story, Reinforced Concrete, Base-Isolated Structure through Bouc-Wen Hysteresis
Patrick Brewick, Erik Johnson, Richard Christenson
5:00 pm – 5:15 pm

622: Tracking Longterm Ambient Responses of Bridges Using Multivariate Correlational Data Analysis Based Upon Measurement Data
Mehdi Norouzi, Ehsan Haji Agha, Victor Hunt, Arthur Helmicki
5:15 pm – 5:30 pm

551: Temperature Effects on Modal Properties of an Updated Full Scale FE Model
Jinwoo Jang, Andrew Smyth
5:30 pm – 5:45 pm

M-3-2 – EMI-MS-05: Second Symposium on Molecular Scale Modeling and Experimentation 4:15 PM – 5:45 PM Chairs: Dinesh Katti, Sinan Keten	Location: FGH-JH 211

338: *Mini-Symposium Keynote:* Atomistic Modeling of Toughening Graphene Through Bio-inspired Topological Design
Huajian Gao
4:15 pm – 4:45 pm

401: Effects of Grain Boundary on the Sources of Size Effects
George Voyiadjis, Mohammadreza Yaghoobi
4:45 pm – 5:00 pm

488: Designing Better Structural Materials by Understanding Nanoconfinement and Nanoscale Interfaces
Sinan Keten
5:00 pm – 5:15 pm

524: Strain Rate Dependent Failure of Interfaces in Glass/Epoxy and Energetic Materials at Nano-Microscale via Dynamic Indentation
Devendra Verma, Vikas Tomar
5:15 pm – 5:30 pm

612: Molecular Characterization and Adhesion Mechanics of Cancer Metastasis on Humanoid Tissue Engineered Scaffolds
Kalpana Katti, MD Shahajahan Molla, Dinesh Katti
5:30 pm – 5:45 pm

M-3-3 – EMI-MS-08: Modeling Time-Dependent Behavior and Deterioration of Concrete 4:15 PM – 5:45 PM Chairs: Mohammed Alnaggar, Giovanni Di Luzio	Location: FGH-JH 138

439: Tightly Coupled Multiphysics Simulation of Alkali-Silica Reaction
Benjamin Spencer, Hai Huang
4:15 pm – 4:30 pm

725: Remaining Potentials of Alkali-Silica Reaction of Existing Concrete Structures
Linfei Li, Yunping Xi
4:30 pm – 4:45 pm

544: Bonded Anchors in Concrete Structures Suffering from ASR Damage
Marco Marcon, Lauren Stenroos, Mohammed Alnaggar, Roman Wendner
4:45 pm – 5:00 pm

718: Rebar Concrete Bond Degradation under Combined Effects of Alkali-Silica Reaction and Corrosion
Lauren Stenroos, Mohammed Abdelatif, Elsayed Salem, Mohammed Alnaggar
5:00 pm – 5:15 pm

610: Temporal Probabilistic Capacity Models of Prestressed Concrete Piles in Corrosive Marine Environments Using Metamodeling Techniques
Jieun Hur, Abdollah Shafieezadeh
5:15 pm – 5:30 pm

720: Determining the Critical Chloride Threshold for Corrosion of Steel Reinforcing Rebars in Synthetic Concrete Pore Solution
Michael Kubista, David Duquette, Mohammed Alnaggar
5:30 – 5:45 pm

M-3-4 – EMI-MS-12: 15th Symposium on Biological and Biologicall Inspired Materials and Structures 4:15 PM – 5:45 PM Chairs: Christian Hellmich, Kalpana Katti, Claire Morin	Location: FGH-JH 136

760: Micromechanics of Plastically Sliding Interfaces: Theoretical Foundations and Application to Bone
Viktoria Vass, Claire Morin, Christian Hellmich
4:15 pm – 4:30 pm

161: Role of Organic-Inorganic Interface Properties in Brick and Mortar Composites
Sina Askarinejad, Nima Rahbar
4:30 pm – 4:45 pm

761: A Continuum Micromechanics Approach to the Elasticity of Planar Fiber Networks: Applications to Paper Materials
Pedro Miguel J. S. Godinho, Leopold Wagner, Viktoria Vass, Josef Eberhardsteiner, Christian Hellmich
4:45 pm – 5:00 pm

512: Bioinspired Design of Cement Polymer Composites
Jessica Rosewitz, Liliana Urso, Christopher Flanagan, Nima Rahbar
5:00 pm – 5:15 pm

644: Chemomechanics of Soft Hydrogels as a Water Reservoir in a Cementitious Matrix
Khashayar Farzanian, Ali Ghahremaninezhad
5:15 pm – 5:30 pm

705: Thermally Activated Building Envelope for Integrated Hazard Mitigation and Thermal Load Management: An Inspiration from Homoeothermic Animal Skin
Hongyu Zhou, Adam Brooks, Zhenglai Shen
5:30 pm – 5:45 pm

M-3-5 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics 4:15 PM – 5:45 PM Chairs: Haim Waisman, Reza Abedi	Location: FGH-JH 134

253: Finite Strain Wave Propagation Analysis in the Micromorphic Media
Farhad Shahabi, Richard Regueiro
4:15 pm – 4:30 pm

461: Parallel Asynchronous Space-Time Method for Computational Structural Dynamics
Waad Subber, Sangmin Lee, Karel Matouš
4:30 pm – 4:45 pm

588: Multiscale Finite Element Modeling for Nonlinear Wave Propagation
Negar Kamali, Sheng-Wei Chi
4:45 pm – 5:00 pm

54: Transient Solid Dynamics on Linear Tetrahedral Finite Elements Using a Variational Multi-Scale Approach
Guglielmo Scovazzi, Xianyi Zeng, Simone Rossi
5:00 pm – 5:15 pm

183: Modeling Stiffness and Damping in the Dynamic Analysis of Stranded Conductor Cables
Nicholas Oliveto, Mettupalayam Sivaselvan
5:15 pm – 5:30 pm

522: Computational Aspects of Morphological Instabilities
Berkin Dörtdivanlıoğlu, Ali Javili, Christian Linder
5:30 pm – 5:45 pm

M-3-6 – EMI-MS-16: Multiphysics and Multiscale Modeling of Engineering Materials 4:15 PM – 5:45 PM Chairs: Chung R. Song, Yong-Rak Kim	Location: FGH-JH 132

557: Modeling of Heterogeneous Quasi-brittle Solids with Viscoelasticity, Interface, Nonlinear Fracture, and Multiphysical Phenomena
Yong-Rak Kim, Keyvan Rami, Taesun You
4:15 pm – 4:30 pm

410: Hydro-Thermal Coupled Multiphysics Simulation for Health Monitoring of Embankment Dam
Chung Song, Tewodros Yosef
4:30 pm – 4:45 pm

404: Simulation on Ethanol based Foaming Process in Asphalt Using Smooth Particle Hydrodynamics
Siyu Zhu, Huiming Yin
4:45 pm – 5:00 pm

409: Virtual Experiments of the Chain-Structure Process of Magnetic Composites by the Inclusion Based Boundary Element Method (iBEM)
Gan Song, Huiming Yin
5:00 pm – 5:15 pm

499: The Three-Dimensional Response of Magnetic Shape Memory Alloys
Heidi Feigenbaum, Constantin Ciocanel, Jason Dikes
5:15 pm – 5:30 pm

388: Self-Heating of a Polymeric Particulate Composite under Mechanical Excitations
Zhenyu Shou, Fangliang Chen, Huiming Yin
5:30 pm – 5:45 pm

M-3-7 – EMI-MS-20: Computational Geomechanics for Subsurface Energy Resources Exploitation 4:15 PM – 5:45 PM Chairs: Shunde Yin, Patrick Selvadurai	Location: Buttrick 103

100: An Inverse Source Problem for Maximizing Wave Motion in Subsurface Poroelastic Formations: A Computational Framework for Field Implementation of a Wave-Based Enhanced Oil Recovery Method
Pranav Karve, Loukas Kallivokas
4:15 pm – 4:30 pm

173: A Hybrid Multi-Scale Computational Framework for Transport Problems in Porous Media
Saeid Karimi, Kalyana Babu Nakshatrala
4:30 pm – 4:45 pm

192: A Minimalist Model for Rapid Simulation of Multiple Hydraulic Fracture Growth
Cheng Cheng, Andrew Bunger, Anthony Peirce
4:45 pm – 5:00 pm

264: An Approach to Track Crack Connectivity for Hydraulic Fracturing Using Graph and Disjoint-Set Data Structures
Philip L. Clarke, Reza Abedi, Omid Omidi
5:00 pm – 5:15 pm

330: Three Dimensional Poroelastic Solution of an Inclined Borehole Subjected to Finite Length Fluid Injection
Shengli Chen
5:15 pm – 5:30 pm

413: Microscale Modeling of Strain Localization in Bleurswiller Sandstone
Shiva Esna Ashari, Giuseppe Buscarnera, Gianluca Cusatis
5:30 pm – 5:45 pm

M-3-8 – EMI-MS-24: Advanced Analysis for Earthquake Engineering 4:15 PM – 5:45 PM Chairs: Kevin Wong, Ramesh Malla	Location: FGH-JH 244

105: Performance Based Design of Diagrid Tall Buildings
Mohammad Bhuiyan, Roberto Leon
4:15 pm – 4:30 pm

647: Seismic Fragility Assessment of Restrained Nonstructural Components Considering Multiple Modes of Failure and Existing Damage from Prior Events
Jieun Hur, Abdollah Shafieezadeh
4:30 pm – 4:45 pm

84: Nonlinear Finite Element Simulation of Seismic Response and Damage of RC Structures
Mohammadreza Moharrami Gargari, Ioannis Koutromanos
4:45 pm – 5:00 pm

471: Dynamic Instability and Sidesway Collapse Analysis of Framed Structures
Kevin Wong, Steven McCabe
5:00 pm – 5:15 pm

664: Understanding Memristors and Memcapacitors in Engineering Mechanics Applications
Jin-Song Pei, Joseph Wright, Michael Todd, Sami Masri, Francois Gay-Balmaz, Pavle Milicevic
5:15 pm – 5:30 pm

M-3-9 – EMI-MS-28: Fluid Dynamics in Natural Hazards 4:15 PM – 5:45 PM Chairs: Aly Mousaad Aly, Elena Dragomirescu	Location: FGH-JH 110

122: An Experimental Study of Rod-Like Debris Flight with Particular Application to Fire Spotting
Ali Tohidi, Nigel Kaye
4:15 pm – 4:30 pm

766: Atmospheric Boundary Layer Simulation and Aerodynamics Investigations of Low-Rise Buildings in an Open-Jet Facility
Hamzeh Gol Zaroudi, Aly Mousaad Aly
4:30 pm – 4:45 pm

111: Temperature and Moisture Effects on the Hurricane Wind Field based on a Simplified Model
Reda Snaiki, Teng Wu
4:45 pm – 5:00 pm

182: Large-Eddy Simulation of Atmospheric Boundary Layer Winds for Structural Engineering Applications
DongHun Yeo, Liang Shi
5:00 pm – 5:15 pm

767: A Framework for Hurricane Hazard Mitigation in Traffic Lighting Support Structures
Hamzeh Gol-Zaroudi, Milad Rezaee, Aly Mousaad Aly
5:15 pm – 5:30 pm

782: Design of a New Experimental Facility for Simulating Wind-Induced Damage on Solar Systems
Elena Dragomirescu, Zhe Xiao, Derek Eden
5:30 pm – 5:45 pm

M-3-10 – PMC PANEL SESSION: Applications of Probabilistic Methods – Emerging Opportunities and Challenges 4:15 PM – 5:45 PM Chair: Sankaran Mahadevan Panelists: Douglas Adams, Vanderbilt University Zissimos Mourelatos, Oakland University Benjamin Smarslok, Air Force Research Laboratory, Wright-Patterson Air Force Base Alexandros Taflanidis, University of Notre Dame	Location: SC 4309

Tuesday, May 24, 2016

8:00am–9:00am	Plenary Lecture – Student Life Center, Ballroom								
9:00am–9:30am	Coffee Break – Student Life Center & Featheringill-Jacobs Hall								
9:30am–11:30am EMI Sessions	EMI-MS-14	EMI-MS-32	EMI-MS-15	EMI-MS 21	EMI-MS-09	EMI-MS-27 & 00	EMI-MS-29 & 31	EMI-MS-19	EMI-MS-37
	Featheringill-Jacobs 110	Featheringill-Jacobs 132	Featheringill-Jacobs 134	Featheringill-Jacobs 136	Featheringill-Jacobs 138	Featheringill-Jacobs 211	Featheringill-Jacobs 244	Buttrick Hall 103	Stevenson Center 4309
9:30am–11:30am PMC Sessions	PMC-MS-17	PMC-MS-19	PMC-MS-06	PMC-MS-01	PMC-MS-14				
	Featheringill-Jacobs 298	Stevenson Center 5306	Stevenson Center 5312	Stevenson Center 5326	Stevenson Center 5211				
11:30am–1:00pm	Lunch – Rand Dining Hall								
1:00pm–2:00pm	Plenary Lecture – Student Life Center, Ballroom								
2:15pm–3:45pm EMI Sessions	EMI-MS-17	EMI-MS-11 & 12	EMI-MS-36	EMI-MS-02	EMI-MS-01	EMI-MS-22	EMI-MS-37		
	Featheringill-Jacobs 132	Featheringill-Jacobs 134	Featheringill-Jacobs 136	Featheringill-Jacobs 138	Buttrick Hall 101	Buttrick Hall 103	Stevenson Center 4309		
2:15pm–3:45pm PMC Sessions	PMC-MS-02	PMC-MS-11	PMC-MS-18	PMC-MS-07	PMC-MS-16	PMC-MS-13			
	Featheringill-Jacobs 211	Featheringill-Jacobs 298	Stevenson Center 5306	Stevenson Center 5312	Stevenson Center 5326	Stevenson Center 5211			
3:45pm–4:15pm	Refreshment Break – Featheringill-Jacobs Hall								
4:15pm–5:45pm EMI Sessions	EMI-MS-13	EMI-MS-16	EMI-MS-02	EMI-MS-39	EMI-MS-26	EMI-MS-01	EMI-MS-19	EMI-MS-37	
	Featheringill-Jacobs 110	Featheringill-Jacobs 132	Featheringill-Jacobs 138	Featheringill-Jacobs 211	Featheringill-Jacobs 244	Buttrick Hall 101	Buttrick Hall 103	Stevenson Center 4309	
4:15pm–5:45pm PMC Session	PMC Panel 2 Stevenson Center 4327								
6:30pm–9:00pm	Banquet – Student Life Center, Ballroom								

PLENARY LECTURE

On the Complexity of Elastic Waves trapped in Convex Features
Domniki Asimaki, California Institute of Technology
Tuesday, May 24, 2016
8:00 am – 9:00 am
Student Life Center, Ballroom
Session Chair: Haim Waisman, Columbia University

Abstract
While treated as a horizontal plane boundary in earthquake engineering and seismological models, the world is clearly not flat. Its irregular ground surface geometry affects strongly the amplitude, frequency and duration of earthquake shaking, and these effects are not only frequently ignored, but can be further complicated depending on the stratigraphy of the subsurface geology and the inelastic constitutive behavior of the underlying soils and rocks. In this talk, I will show a collection of examples that highlight the effects of topography on seismic ground shaking, and I will point out what these results suggest in the context of the current state of earthquake engineering practice. Examples will range from semi-analytical solutions of wave propagation in infinite wedges, to centrifuge experiments, to three-dimensional numerical simulations of topography effects using digital elevation map-generated models and layered inelastic geologic features. I will then present a system of dimensionless parameters that we have synthesized to study these complex wave propagation effects that beyond earthquake engineering, are relevant to a much wider range of fields, from non-destructive material testing to studies of continental plate margins. I will conclude by showing that what we typically refer to as topography effects in seismology and engineering are a lot less topography-dependent than their characteristic terminology suggests.

Biographical Sketch
Domniki Asimaki is a Professor of Mechanical and Civil Engineering at Caltech. She has a bachelor's diploma from the National Technical University of Athens, Greece (1998), and an MS (2000) and PhD (2004) from the Department of Civil and Environmental Engineering at MIT. Her research focuses on the understanding and simulation of 3D site effects, and their impact on the design and performance of geotechnical systems. She is associate editor for the ASCE Journal of Geotechnical and Geoenvironmental Engineering, for Earthquake Spectra, and for Soil Dynamics and Earthquake Engineering. Among other awards, she has received the 2009 Arthur Casagrande Award from the ASCE Geo-Institute, the 2012 Shamsher Prakash Research Award in Geotechnical Earthquake Engineering, and the 2015 Young Investigator Award in Geotechnical Earthquake Engineering from the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE).

PLENARY LECTURE

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
Tuesday, May 24, 2016
1:00 pm – 2:00pm
Student Life Center, ballroom
Session Chair: George Deodatis, Columbia University

Abstract
Historically, structures have been designed to resist external loads under the tacit assumption of stationarity and Gaussianity, with the exception of special cases. Recent recognition of the need to capture non-stationary and non-Gaussian features, based on the realization that most environmental load effects typically bear these features, has led to many advances in these areas that have matured to the stage that they are ready to be embraced by the design community. Areas where there is a need to account for non-stationary features include: transient wind conditions experienced in thunderstorms by aircrafts aloft and structures near ground exposed to gust fronts, which may lead to an overshoot in pressures thus significantly enhancing demand. Similarly, in many cases the loads and their effects may significantly depart from Gaussianity, which may result in a response that may not bear any resemblance to the linear/Gaussian response and its extremes may far exceed the corresponding estimates relying on Gaussian assumption. Examples include: building cladding under wind; dynamic load effects on low-rise buildings and aerodynamics of long-span bridges; and wind turbines under turbulence. The lecture will highlight recent advances in these areas and new ways of thinking about and addressing these problems in research, applications and education to ensure the safety and integrity of the infrastructure.

Biographical Sketch
Ahsan Kareem is the Robert M. Moran Professor of Engineering and the Director of the NatHaz Modeling Laboratory at the University of Notre Dame. He is elected President of the International Association for Wind Engineering (IAWE). He has been awarded numerous honors, including the Presidential Young Investigator Award from the White House Office of Science and Technology. A recipient of ASCE's Theodore von Karman Medal, James Croes Medal, Robert H. Scanlan Medal and Jack E. Cermak Medal and State-of-the-Art Award, inducted to the Offshore Technology Conference Hall of Fame and Distinguished Member of ASCE, Alan G. Davenport Medal of IAWE and Distinguished Research Award of IASSAR (Int'l Assoc. for Structural. Safety and Reliability) and the University of Notre Dame. He has served as a High-End Consultant to Tongji University and 2013 Scruton Lecturer at the Institute of Civil Engineers, London, UK. He has been appointed Honorary Professor at several universities overseas, serves on the Editorial Board of several international journals and has recently co-authored two books. He is an elected Member of the US National Academy of Engineering and a Foreign Fellow of the Indian National Academy of Engineering.

PARALLEL SESSIONS – TUESDAY, MAY 24

PARALLEL SESSIONS 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 Chairs: Bernhard Pichler, Christian Hellmich	Location: FGH-JH 138

480: Characterization of Chemical Composition and Microstructure of Synthesized Alkali-Silica Gel with Small-Angle Neutron and X-Ray Scattering
Shuaicheng Guo, Xiao Sun, Qingli Dai
9:30 am – 9:45 am

584: The Mesoscale Texture of Cement Hydrates
Katerina Ioannidou, Franz-Josef Ulm, Emanuela Del Gado, Roland Pellenq
9:45 am –10:00 am

218: Isochoric Creep of Hydrate Gel Needles Explains Macroscopic Creep of Cementitious Materials
Markus Königsberger, Muhammad Irfan-ul-Hassan, Christian Hellmich, Bernhard Pichler
10:00 am – 10:15 am

538: Multi-Scale Probabilistic Analysis of the Elastic Modulus of Concrete Using Digital Image Processing
Maha Mrad, George Saad, Ghassan Chehab
10:15 am – 10:30 am

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, Yong-Rak Kim
10:30 am –10:45 am

582: Reinforcing Cementitious Structures by In-Situ Shrinking Microfibers
Patrick C. Lee, Ting Tan, Eric Kim, Louis Kiefer, Dryver Huston
10:45 am – 11:00am

528: Application of Functional Quantization to Probabilistic Service-Life Models for Corrosion of Reinforced Concrete
Manuel Miranda, Gabriella Sampaio
11:00 am – 11:15 am

251: Free Surface and Non-Newtonian Flow using Lattice Boltzmann Method: An Application in Wellbore Cementing
Matthew Grasinger, Julie Vandenbossche, John Brigham
11:15 am – 11:30 am

T-1-2 – EMI-MS-14: Advances in Experimental, Theoretical and Computational Fracture Mechanics 9:30 AM – 11:30 AM Chairs: Haim Waisman, Christian Linder	Location: FGH-JH 110

360: Direct Evaluation of Stress Intensity Factors for Curved Cracks Using Irwin's Integral and a High-Order Extended Finite Element Method
Yongxiang Wang, Haim Waisman, Isaac Harari
9:30 am – 9:45 am

269: A Phase Field Model for Diffusion Induced Fracture in Lithium-Ion Batteries
Xiaoxuan Zhang, Christian Linder
9:45 am – 10:00 am

291: Virtual Crack Extension Method for Elasto Plastic Fracture Analysis Using the Complex Finite Element Method
Arturo Montoya, Harry Millwater
10:00 am – 10:15 am

304: Fracture Investigation of Organic Rich Shale: Microscopic to Macroscopic Scale
Pooyan Kabir, Yue Cui, Ange-Therese Akono
10:15 am – 10:30 am

380: Stochastic Analysis of Polymer Composites Failure in Large Deformations Modeled by a Phase Field Method
Jie Wu, Colin McAuliffe, Hain Waisman, George Deodatis
10:30 am – 10:45 am

568: Elasticity and Fracture of Clay-Based Materials at the Nano-Scale
Jeremie Berthonneau, Christian Hoover, Olivier Grauby, Alain Baronnet, Roland Pellenq, Franz Josef Ulm
10:45 am – 11:00 am

415: General Elements for XFEM Using Physically-Based Enrichment Parameters
Iman Asareh
11:00 am – 11:15 am

31: Strain Rate Dependent Microplane Constitutive Model for Comminution of Concrete under Projectile Impact
Kedar Kirane, Yewang Su, Zdeněk Bažant
11:15 am – 11:30 am

T-1-3 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics 9:30 AM – 11:30 AM Chair: Ravindra Duddu	Location: FGH-JH 134

555: Computational FSI with Applications
Yuri Bazilevs
9:30 am – 9:45 am

155: Advances in Fluid-Structure Interaction Simulations of Wind Turbines, Aerospace and Offshore Structures
Artem Korobenko, Jinhui Yan, Xiaowei Deng, Yuri Bazilevs
9:45 am – 10:00am

599: Foundation Structure Interaction for Wind Turbine Towers
Sukhvarsh Jerath, Sam Austin
10:00 am – 10:15 am

403: A Two-Scale Nonlinear Generalized FEM for the Simulation of Spot Welds in Large Structures
Haoyang Li, C. Armando Durate
10:15 am – 10:30 am

433: Analysis of Three-Dimensional Curved Beams Using Isogeometric Approach
Guodong Zhang, Ryan Alberdi, Kapil Khandelwal
10:30 am – 10:45 am

514: Mean-Strain 10-Node Tetrahedron with Energy-Sampling Stabilization
Alireza Pakravan, Petr Krysl
10:45 am – 11:00 am

523: A Computational Approach to Model Strain-Induced Crystallization in Rubber
Reza Rastak, Christian Linder
11:00 am – 11:15 am

655: Efficient Model Order Reduction of Problems with Material Nonlinearities Using a Localized Discrete Empirical Interpolation Method
Fariborz Ghavamian, Paolo Tiso, Angelo Simone
11:15 am – 11:30 am

T-1-4 – EMI-MS-19: Computational Geomechanics 9:30 AM – 11:30 AM Chairs: Majid Manzari, Qiushi Chen	Location: Buttrick 103

231: Poromechanical Cohesive Surface Element with Elastoplasticity for Modeling Cracks and Interfaces in Fluid-Saturated Geomaterials
Richard Regueiro, John Sweetser, Wei Wang, Erik Jensen
9:30 am – 9:45 am

110: Modeling Hydraulic Fracture of Ice Shelves Using Continuum Damage Mechanics
Mostafa Mobasher, Ravindra Duddu, Jeremy Bassis, Haim Waisman
9:45 am – 10:00 am

609: A Peridynamic Model for Hydraulic Fracture
John Foster, Jason York, Hisanao Ouchi, Mukul Sharma
10:00 am –10:15 am

271: Effects of Material Spatial Randomness on Dynamic Fracturing in Rocks
Omid Omidi, Reza Abedi, Philip L. Clarke, Saeid Enayatpour
10:15 am – 10:30 am

532: Run-Out Distance and Depositional Configuration for Flow-Like Landslides Using the SPH Method
Alomir Favero, Ronaldo Borja
10:30 am – 10:45 am

309: Quantitative Analysis of the Micro-Mechanisms of Piping Erosion with Coupled CFD-DEM Method
Hui Tao, Junliang Tao
10:45 am – 11:00 am

T-1-5 – EMI-MS-21: Fluid-Dependent Mechanics of Porous Materials: A Focus on the Nanoscale 9:30 AM – 11:30 AM Chairs: Mohammad Qomi, Matthew Vandamme	Location: FGH-JH 136

222: Interaction Grand Potential between Calcium-Silicate-Hydrate Nanoparticles at the Molecular Level
Patrick Bonnaud, Christophe Labbez, Riuji Miura, Ai Suzuki, Naoto Miyamoto, Nozomu Hatakeyama, Akira Miyamoto, Krystyn Van Vliet
9:30 am – 9:45 am

527: Meso-Chemo-Mechanics of Calcium-Silicate-Hydrates
Saeed Masoumi, Hamid Valipour, Mohammad Javad Abdolhosseini Qomi
9:45 am – 10:00 am

347: Multi-Scale Modeling of Adsorption-Induced Deformation of Micro-Porous Materials
Mingyang Chen, Karol Kulasinski, Benoit Coasne, Robert Guyer, Dominique Derome, Jan Carmeliet
10:00 am – 10:15 am

178: Continuum Mechanics with Violations of Second Law of Thermodynamics
Martin Ostoja-Starzewski
10:15 am – 10:30 am

119: Multiscale Modeling of Textural and Mechanical Properties of Clay
Davoud Ebrahimi, Andrew Whittle, Roland Pellenq
10:30 am – 10:45 am

493: Effect of Relative Humidity on Basal Spacing and Stiffness of Stack of Clay Layers
Linlin Wang, Benoît Carrier, Sébastien Brisard, Matthieu Vandamme
10:45 am – 11:00 am

745: On the Nanoscale Origins of Time-Dependent Deformations in Nanoporous Materials
György Hantal, Guillaume Galliero, Romain Vermorel, Gilles Pijaudier-Cabot
11:00 am – 11:15 am

435: Transient Effects of Drying Creep in Nanoporous Solids: Understanding the Effects of Nanoscale Energy Barriers
Robert Sinko, Matthieu Vandamme, Zdeněk Bažant, Sinan Keten
11:15 am – 11:30 am

T-1-6 – EMI-MS-27: Advances and Applications of Elasticity within Applied Mechanics 9:30 AM – 11:30 AM Chairs: Sonia Mogilevskaya, Ney Dumont	Location: FGH-JH 211

520: Prediction of Material Consolidation in In718 Produced Using Selective Laser Melting in the Higher Throughput Parameter Regime
Tracie Prater
9:30 am – 9:45 am

276: The Use of Shape Memory Alloys in Near-Surface Mounted Strengthening Applications
Sherif M. Daghash, Osman E. Özbulut
9:45 am – 10:00 am

279: Development of Fiber-Reinforced Polymer Composites with Superelastic Shape Memory Alloys
Sherif M. Daghash, Osman E. Özbulut
10:00 am – 10:15 am

377: Characterization of Mechanical and Electrical Properties of SMA-PVA Fiber-Reinforced Cementitious Composites
Muhammad M. Sherif, Radhika Pavgi, Evelina Khakimova, Osman E. Özbulut, H. Celik Ozyildirim
10:15 am – 10:30 am

448: Investigation of Stress-Induced Martensite Transformation in a Large-Diameter NiTiNb Bar for Self-Stressing Applications
Muhammad M. Sherif, Osman E. Özbulut
10:30 am – 10:45 am

69: Three-Dimensional Displacement Field of Isotropic Elastic Spheres
K.T. Chau
10:45 am – 11:00 am

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, Carlos Andres Aguilar, Wellington Tatagiba De Carvalho
11:00 am – 11:15 am

228: Stress-Based Topology Optimization of Continua with Material Uncertainty
Hamid Kaboodanian, Navid Changizi, Mehdi Jalalpour
11:15 am – 11:30 am

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 Chairs: Celalettin Emre Özdemir, James Kaihatu / Qin Chen	Location: FGH-JH 244

109: A Simplified Analytical Wind-Field Model for Hurricane Boundary Layer
Reda Snaiki, Teng Wu
9:30 am – 9:45 am

596: A Multi-Scale Multi-Physics Approach to Modeling Coastal Bridge Collapse
Qin Jim Chen, Xuebin Chen, Agnimitro Chakrabarti, Jiemin Zhan
9:45 am – 10:00 am

487: Nonlinear and Directional Effects of Waves in Areas of High Dissipation: Implications for Coastal Hazard Characterization
James Kaihatu, Ying-Po Liao, Samira Ardani
10:00 am – 10:15 am

586: Towards Incorporating Soil Substrate Properties into a Marsh Edge Erosion Model
Cody Johnson, Qin Chen, Arash Karimpour, Navid Jafari, Thomas Everett
10:15 am – 10:30 am

624: Application of OpenFOAM in Solving Coastal Engineering Problems by Massively Parallel Navier Stokes Solvers Using Large Eddy Simulation Turbulence Closures
Agnimitro Chakrabarti, Qin Jim Chen
10:30 am – 10:45 am

215: Computational Free-Surface FSI with Applications
Jinhui Yan, Artem Korobenko, Xiaowei Deng, Yuri Bazilevs
10:45 am – 11:00 am

124: A Numerical Study on Modeling Heterogeneous Coastal Sediment Transport Using Multiphase Eulerian and Euler-Lagrangian Approaches
Zhen Cheng, Xiao Yu, Tian-Jian Hsu, Julien Chauchat, Joseph Calantoni
11:00 am – 11:15 am

505: High Performance Computing in the Modeling of Recycled Water Release Infrastructure in the City of Gold Coast, Australia
Lauren Schmied, Anna Symonds, Prema Bhautoo, Caroline Lai, Simon Mortensen, Anna Hollingsworth, Daniel Grimwood
11:15 am – 11:30 am

T-1-8 - EMI-MS-32: Topology Optimization; Algorithms and Applications 9:30 AM – 11:30 AM Chairs: Mazdak Tootkaboni, Mehdi Jalalpour	Location: FGH-JH 132

771: Free Form Finding of Grid Shell Structures
Yang Jiang, Lin Yan, Tomas Zegard, Glaucio Paulino
9:30 am – 9:45 am

240: Optimization of Geometric Parameters of an Adjustable Module for Variable Depth Arch Bridges
Yao Wang, Ashley Thrall, Theodore Zoli
9:45 am – 10:00 am

128: Multiple-Material Topology Optimization of Cellular Material Architectures
Josephine Carstensen, James Guest
10:00 am – 10:15 am

163: Implementation of Functionally Graded Materials in Compliant Mechanism Design Using Topology Optimization
Cian Conlan-Smith, Kai A. James
10:15 am – 10:30 am

164: Simultaneous Topology and Material Design Optimization of Functionally Graded Structures
Kai James, Anurag Bhattacharyya, Cian Conlan-Smith
10:30 am – 10:45 am

511: Topology Optimization for Additive Manufacturing
Mikhail Osanov, Christopher B. Williams, James K. Guest
10:45 am – 11:00 am

774: Topology Optimization with Manufacturing Constraints: A Unified Projection-Based Approach
Cicero de Lima, Sandro Vatanabe, Tiago Lippi, Emilio Silva, Glaucio Paulino
11:00 am – 11:15 am

773: Bridging Topology Optimization and Additive Manufacturing
Tomas Zegard, Glaucio Paulino
11:15 am – 11:30 am

T-1-9 - EMI-MS-37: Computational Modeling in Civil Engineering 9:30 AM – 11:30 AM Chairs: Kevin Mackie, Katerina Ziotopolou	Location: SC 4309

83: Triaxial Material Model for Concrete under Cyclic Loading
Mohammadreza Moharrami Gargari, Ioannis Koutromanos
9:30 am – 9:45 am

35: Inelastic Coupled Yield Surface Development for Standard Steel Sections
Harsha Manglekar, Benyam Belega, Tathagata Ray
9:45 am – 10:00 am

4: Constitutive Model for Steel Reinforcement under Cyclic Loading
Se-Hyung Kim, Ioannis Koutromanos
10:00 am – 10:15 am

533: Plasticity Modeling of Liquefaction Effects under Sloping Ground Conditions: Investigation of Underlying Mechanisms and Recent Advancements
Katerina Ziotopoulou, Ross Boulanger
10:15 am – 10:30 am

142: A Constitutive Model for Matching Modulus Reduction and Damping Behavior
Samuel Yniesta, Scott Brandenberg
10:30 am – 10:45 am

650: Effect of Temperature and Performance of Stabilized Formulations for Viscous Fingering and Mixing in Porous Media
Mohammad Shabouei, Kalyana Babu Nakshatrala
10:45 am – 11:00 am

254: Vertical Inertial Response of an Elastic Pile Embedded within Gibson's and Weathered Soils
Josue Labaki, Euclides Mesquita, Nimal Rajapakse
11:00 am – 11:15 am

67: Mechanical Modeling of Steel Top and Seat Angle Connections with and without Web Angles Subjected to Elevated Temperatures
Sana El Kalash, Elie Hantouche
11:15 am – 11:30 am

T-1-10 – PMC-MS-01: Advanced Simulation-Based Approaches to Uncertainty Quantification and Reliability Analysis 9:30 AM – 11:30 AM Chair: Michael Shields	Location: SC 5326

754: A Stochastic Model for the Human Heading for Uncertainty Quantification of TBI Prediction
Kirubel Teferra, Siddiq Qidwai, Shankarjee Krishnamoorthy
9:30 am – 9:45 am

18: Probabilistic Geotechnical Site Characterization through Stochastic Inverse Analysis of Geophysical Test Measurements
Siddharth S. Parida, Kallol Sett, Puneet Singla
9:45 am – 10:00 am

20: Effect of Actuator Delay on Uncertainty Quantification for Real-Time Hybrid Simulation
Kai Chen, Weijie Xu, Cheng Chen, Tong Guo
10:00 am – 10:15 am

144: Probabilistic Framework to Assess Maximum Nonlinear Structural Response Based on Sensor Measurements
Ajay Saini, Iris Tien
10:15 am – 10:30 am

311: A Stochastic Simulation Method of Ground Motions for Specified Earthquake Scenarios
Christos Vlachos, Konstantinos G. Papakonstantinou, George Deodatis
10:30 am – 10:45 am

665: Identifiability Assessment of Nonlinear Structural System Identification Problems
Hamed Ebrahimian, Rodrigo Astroza, Joel Conte, Robert Bitmead
10:45 am – 11:00 am

T-1-11 – PMC-MS-06: Model Uncertainty in Multidisciplinary Analyses 9:30 AM – 11:30 AM Chairs: Ben Smarslok, Diane Villanueva	Location: SC 5312

652: Challenges with Uncertainty Quantification for Hypersonic Aircraft Structures
Benjamin Smarslok
9:30 am – 9:45 am

146: Impact of Boundary Conditions and Modeling Assumptions on the Coupled Response of Structural Panels in High Speed Flow
Abhijit Gogulapati, Jack McNamara
9:45 am – 10:00 am

156: Data-Driven Modeling of Full-Field Pressure Measurements for Aeroelastic Response Predictions
Gregory Bartram, Ricardo Perez, Benjamin Smarslok
10:00 am – 10:15 am

356: Structural Response Sensitivity to Boundary Layer Transition in High Speed Flow
Zachary Riley, Jack McNamara
10:15 am – 10:30 am

58: Probabilistic Modeling of Thermal Properties of Hot Structures and its Propagation to the Nonlinear Geometric Structural Response
Pengchao Song, Andrew Matney, Raghavendra Murthy, X.Q. Wang, Marc Mignolet
10:30 am – 10:45 am

277: Global Sensitivity Analysis for Time-Dependent, Multidisciplinary Simulation
Erin DeCarlo, Sankaran Mahadevan, Benjamin Smarslok
10:45 am – 11:00 am

236: Budgeting Model Calibration Experiments with Expected Information Gain
Diane Villanueva, Benjamin Smarslok
11:00 am – 11:15 am

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 Chairs: Seymore Spence, Alexandros Taflanidis	Location: SC 5211

44: Time-Space Probabilistic Model for Wind Speeds and Structural Responses
Haoran Zhao, Mircea Grigoriu
9:30 am – 9:45 am

96: Revisiting Moment-Based Hermite Model for Estimation of Extreme Value Distributions of Non-Gaussian Response Processes
Min Liu, Xinzhong Chen, Qingshan Yang
9:45 am – 10:00 am

657: Risk-Based Life-Cycle Management of Fatigue-Sensitive Structures
Mohamed Soliman
10:00 am – 10:15 am

9: Multi-Criteria Design of Fluid Viscous Dampers Based on Life-Cycle Performance Criteria and Risk-Aversion Principles
Ioannis Gidaris, Alexandros Taflanidis, Georgios Mavroeidis
10:15 am – 10:30 am

316: Reliability-Based Topology Optimization of Truss Structures Using a Discrete Filtering System
Junho Chun, Glaucio H. Paulino, Junho Song
10:30 am – 10:45 am

521: A Heuristic Seismic Optimization Approach Based on Topology Optimization
Orlando Arroyo, Abbie Liel
10:45 am – 11:00 am

772: Reliability-Based Topology Optimization Using a New Method for Sensitivity Approximation
Ke Liu, Glaucio Paulino, Paolo Gardoni
11:00 am – 11:15 am

589: Performance-Based Multi-Hazard Topology Optimization of Structural Systems
Arthriya Suksuwan, Seymour M.J. Spence
11:15 am – 11:30 am

T-1-13 – PMC-MS-17: Modeling Resilient Infrastructure 9:30 AM – 11:30 AM Chairs: John van de Lindt, Paolo Gardoni	Location: FGH-JH 298

724: *Mini-Symposium Keynote:* Time-Variant Seismic Resilience of Aging Bridge Networks
Fabio Biondini, Luca Capacci, Andrea Titi
9:30 am – 10:00 am

86: Multi-Hazard Resilient and Sustainable (or MRS) Bridges – Stronger, Taller, Wider, Smarter?
Mi G. Chorzepa, Arash Saeidpour
10:00 am – 10:15 am

187: Functionality-Fragility Surfaces: A Tool for Probabilistic Resilience Analysis of Bridges
Aman Karamlou, Paolo Bocchini
10:15 am – 10:30 am

340: Resilience of Small Bridges in Case of Extreme Rainstorms
Mario Lucio Puppio, Linda Giresini, Mauro Sassu
10:30 am – 10:45 am

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, Jamie Padgett
10:45 am – 11:00 am

419: A General Formulation for Modeling Impacts of Deterioration on Reliability of Infrastructure Systems
Gaofeng Jia, Paolo Gardoni
11:00 am – 11:15 am

713: Transportation Network Disruptions and Vulnerability Assessment for Retrofitting and Recovery Planning: An Agent-based Modeling Approach
Alireza Mostafizi, Haizhong Wang, Dan Cox, Lori Cramer
11:15 am – 11:30 am

T-1-14 – PMC-MS- 19: Characterization, Simulation, and Modeling of Random Heterogeneous Materials 9:30 AM – 11:30 AM Chairs: Johann Guilleminot, Lori Graham-Brady	Location: SC 5306

779: Residual Strength of Preloaded Quasibrittle Structures and Size Effect on Its Statistical Distribution Based on Nanomechanics
Zdeněk Bažant, Marco Salviato, Kedar Kirane
9:30 am – 9:45 am

21: Stochastic Modeling of Hyperelastic Materials
Brian Staber, Johann Guilleminot
9:45 am – 10:00 am

230: On Macro- and Multi-Scale Approximations for Micro-Scale Material Responses
Mircea Grigoriu
10:00 am – 10:15 am

337: Mesoscale Material Properties Fields; Partitioning Strategies and Probabilistic Descriptions
Sarah Baxter, Katherine Acton
10:15 am – 10:30 am

322: Generation of Higher-order Stochastic Material Morphologies Using Bispectral Representation Method
Hwanpyo Kim, Michael Shields
10:30 am – 10:45 am

753: Optimization of Data Collection Protocols for Efficient Microstructure Reconstruction
Kirubel Teferra, Lori Graham-Brady, Michael Uchic, Michael Groeber
10:45 am – 11:00 am

405: A Comparison between Measured and Predicted Least Principal Stresses Using a Viscoplastic Model
Fatemeh Rassouli, Mark Zoback, Shaochuan Xu
11:00 am – 11:15 am

708: Supervised Learning of Constitutive Laws
Ramin Bostanabad, Zeliang Liu, Wei Chen, Wing Kam Liu
11:15 am – 11:30 am

PARALLEL SESSIONS 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 Chairs: Manolis Chatzis, Erik Johnson	Location: Buttrick 101

274: Crowdsourcing-Based Structural Health Monitoring Using Smartphones
Ekin Ozer, Maria Q. Feng
2:15 pm – 2:30 pm

613: An Application of a Modified Colliding Bodies Optimization Algorithm in Health Monitoring of Structures Using Flexibility Changes
Mohsen Maniat, Ali Zare Hosseinzadeh, Mohammad Farshchin, Charles V Camp
2:30 pm – 2:45 pm

476: Structural Health Monitoring Using a Network of Smartphones
Kyle Wyatt, Tat Fu, Rui Zhang
2:45 pm – 3:00 pm

479: In Situ Material State Monitoring Using Embedded Cadmium Selenide Quantum Dots
Cole Brubaker, Talitha Frecker, Ian Njoroge, Kane Jennings, Douglas Adams
3:00 pm – 3:15 pm

333: Time-Scale Blind Source Separation Using Independent Component Analysis for Identification of Highly-damped Structures
Arash Kamali-Asl, Alireza Farzampour, Babak Kamali-Asl
3:15 pm – 3:30 pm

73: Vibration Testing of an In-Service Pre-Stressed Concrete Highway Bridge Using Martlet Wireless Sensing System
Xi Liu, Xinjun Dong, Yang Wang
3:30 pm – 3:45 pm

T-2-2 –EMI-MS-02: Stability and Failure of Structures and Materials 2:15 PM – 3:45 PM Chairs: Ahmer Wadee, Dongyun Ge	Location: FGH-JH 138

33: Harmonic Analysis of Elliptical Hollow Section Tubes in Bending
Finian McCann, M. Ahmer Wadee, Leroy Gardner
2:15 pm – 2:30 pm

355: Stability Analysis of the Phase-Field Method for Fracture in Linear Elastic, Rate-Independent Plastic, and Visco-Plastic Materials
Miguel Arriaga, Colin McAuliffe, Haim Waisman
2:30 pm – 2:45 pm

3: Theoretical Background of Steel Storage Tanks Buckling Design Equations: Assumptions and Limitations
Sukru Guzey, Eyas Azzuni
2:45 pm – 3:00 pm

193: Observation and Model for Acoustic Emission Aftershocks Generated Around the Surface of Tensile Cracks in Crystalline Rock
Andrew Bunger, James Kear, Arcady Dyskin, Elena Pasternak
3:00 pm – 3:15 pm

364: Numerical Bifurcation Analysis of an Anisotropic Used Fuel Cladding Damage Model Incorporating Circumferential and Radial Hydride Responses
Zhengshou Lai, Qiushi Chen, Jakob Ostien
3:15 pm – 3:30 pm

751: Engineering Interpretations of Various Buckling Methodologies Used in Nuclear Design Code Evaluations of Rigid Strut Assemblies
Dennis K. Williams, Shrikant Nargund
3:30 pm – 3:45 pm

T-2-3 –EMI-MS-11/12: Multiscale Mechanics of Bio-Inspired and Biological Materials and Structures 2:15 PM – 3:45 PM Chairs: Nima Rahbar, Steven Cranford	Location: FGH-JH 134

174: The Effect of Water Molecules on Mechanical Properties of Bamboo Microfibrils
Sina Youssefian, Nima Rahbar
2:15 pm – 2:30 pm

601: Multiscale Mechanics of Mechanochemically Responsive Elastomer
Qiming Wang
2:30 pm – 2:45 pm

639: Energy Dissipation Strategies inside the Mantis Shrimp's Dactyl Club: Hypotheses and Biomimetics
Nobphadon Suksangpanya, Nicolas Guarin, Nick Yaraghi, Steven Herrera, David Kisailus, Pablo Zavattieri
2:45 pm – 3:00 pm

719: Implantable Magnetic Nanocompsites for Cancer Treatment
Kwabena Kan-Dapaah, Nima Rahbar, Wole Soboyejo
3:00 pm – 3:15 pm

730: Patient-Specific Fracture Risk Assessment of Vertebrae: A Multiscale Approach Coupling X-Ray Physics and Continuum Micromechanics
Romane Blanchard, Claire Morin, Andrea Malandrino, Alain Vella, Zdenka Sant, Christian Hellmich
3:15 pm – 3:30 pm

526: The Mechanics of Biomimetic Polymer Artificial Muscles
Heidi Feigenbaum, Michael Shafer, Daniel Pugh, Matthew Fisher
3:30 pm – 3:45 pm

T-2-4 –EMI-MS-17: Modeling the Mechanics of Material Surfaces and Interfaces 2:15 PM – 3:45 PM Chair: Ravindra Duddu	Location: FGH-JH 132

226: Stabilized Interface Formulation for Frictional Dynamics
Timothy Truster, Arif Masud
2:15 pm – 2:30 pm

341: Simulation of 3-D Hydraulic Fracture Propagation and Interactions near a Wellbore
C. Armando Duarte, Piyush Gupta
2:30 pm – 2:45 pm

583: Generation of Conformal Finite-Element Meshes from 3D Measurements of Microstructurally Small Fatigue-Crack Propagation
Ashley Spear, Jacob Hochhalter, Albert Cerrone, Anthony Ingraffea
2:45 pm – 3:00 pm

637: A Phantom Node Approach for Modeling Intersecting Fractures
Chandrasekhar Annavarapu, Randolph Settgast, Efrem Vitali, Joseph Morris
3:00 pm – 3:15 pm

137: Mesoscale Thermomechanical Modeling of Energetic Material Interfaces Under Transient Loading
Ruize Hu, Çağlar Oskay
3:15 pm – 3:30 pm

395: Effect of Thermal Fields on Interface Strength in Fibrous Composites: A DG Method with Consistently Evolving Stabilization
Pinlei Chen, Arif Masud
3:30 pm – 3:45 pm

T-2-5 –EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling 2:15 PM – 3:45 PM Chairs: Matthew Kuhn, Anthony Rosato	Location: Buttrick 103

114: DEM Simulations of Failure Process of Continuum Based on Principle Stress Analysis
Shunying Ji, Yongjun Li
2:15 pm – 2:30 pm

242: 3D Experimental Investigation of Local Shearing in Triaxial Testing of Sand
Andrew Druckrey, Khalid Alshibli
2:30 pm – 2:45 pm

249: 3D Experimental Investigation of Fabric Evolution during Triaxial Compression of Granular Materials
Andrew Druckrey, Khalid Alshibli
2:45 pm – 3:00 pm

358: Influence of Particle Morphology on 3D Kinematic Behavior and Strain Localization of Sheared Sand
Maha Jarrar, Khalid Alshibli, Boning Zhang, Richard Regueiro
3:00 pm – 3:15 pm

742: Investigation of Shear Bands in Granular Materials Using the Level Set Discrete Element Method
Reid Kawamoto, Jose Andrade
3:15 pm – 3:30 pm

418: Shear Induced Glass Transition in a Granular System
Jie Zhang, Yinqiao Wang, Yi Luo
3:30 pm – 3:45 pm

T-2-6 –EMI-MS-36: Analytical and Experimental Investigations on Resilient Critical Infrastructure under Multiple Hazards 2:15 PM – 3:45 PM Chairs: Mija H. Hubler	Location: FGH-JH 136

43: Dynamics of Wind Turbine Structures Subjected to Hurricane Winds
Gholamreza Amirinia, Sungmoon Jung
2:15 pm – 2:30 pm

48: Vulnerability Estimation of Low-Rise Buildings against Wind Hazard Considering Uncertainty in Building Components
Grzegorz Kakareko, Sungmoon Jung, O. Arda Vanli, Spandan Mishra
2:30 pm – 2:45 pm

141: Simulation of Wind and Wave Field for Coastal Infrastructures
Jin Zhu, Wei Zhang
2:45 pm – 3:00 pm

234: Mitigation of Structural Response Due to Near-Field Seismic Ground Motion Using an Optimized Innovative Rotational Inertia Damping Device
Abdollah Javidialesaadi, Nicholas Wierschem
3:00 pm – 3:15 pm

157: Variable Input Space Controller for Multi-Hazard Mitigation
Liang Cao, Simon Laflamme
3:15 pm – 3:30 pm

762: Wind-Wave Induced Vibration Control of Offshore Floating Wind Turbines
Chao Sun
3:30 pm – 3:45 pm

T-2-7 –EMI-MS-37: Computational Modeling in Civil Engineering 2:15 PM – 3:45 PM Chairs: Michael Motley, Ioannis Koutromanos	Location: SC 4309

325: Reduced Order Modeling for Progressive Collapse Simulation of RC Structures
Li Shan, Sashi Kunnath
2:15 pm – 2:30 pm

649: Nonlinear Analysis of Concrete Members Exposed to Elevated Temperatures
Manar Al Fadul, Kevin Mackie
2:30 pm – 2:45 pm

207: Thermo-Mechanical Modeling of Reinforced Concrete Masonry Infill Panels Exposed to Fire
Puneet Kumar, Gaurav Srivastava
2:45 pm – 3:00 pm

149: 2D Meso-Scale Modeling of Masonry Elements Using Cohesive Elements
Shenghan Zhang, Seyedeh Mohadeseh Taheri Mousavi, Nicolas Richart, Jean-François Molinari, Katrin Beyer
3:00 pm – 3:15 pm

489: Elastoplastic and Geometrically Nonlinear Analysis of Frame Structures Based on Generalized Total Potential Energy Functional
Charalampos Andriotis, Konstantinos Papakonstantinou
3:15 pm – 3:30 pm

715: Verification of the Spectral Period Range for Ground Motion Scaling in Structural Nonlinear Dynamic Analysis
Bo Chen, Zengping Wen
3:30 pm – 3:45 pm

T-2-8 – PMC-MS-02: Probabilistic Methods for Fatigue Damage Monitoring, Diagnosis and Prognosis 2:15 PM – 3:45 PM Chairs: Eric M. Hernandez, Yongming Liu	Location: FGH-JH 211

11: Probabilistic Fatigue Life Assessment of Reinforced Concrete Structures Subjected to Corrosion
Yafei Ma, Yibing Xiang, Lei Wang, Jianren Zhang, Yongming Liu
2:15 pm – 2:30 pm

45: Probabilistic Detection of Delamination in Composite Laminates Using Bayesian Inference of Lamb Wave Signals
Tishun Peng, Yongming Liu
2:30 pm – 2:45 pm

263: Probabilistic Mesoscale Simulation of High Cycle Fatigue by Mixed Trans-Intergranular Crack Growth Method
Hao Yuan, Wei Zhang, Jeongho Kim
2:45 pm – 3:00 pm

104: Damage Decision Support Synthesizing Inspected Structural Health
Mark Groden, Matthew Collette
3:00 pm – 3:15 pm

694: A Reliability-Based Approach to Probabilistic Remaining Useful Life Prediction in Mechanical Systems
Shankar Sankararaman
3:15 pm – 3:30 pm

241: Robust Bayesian Fatigue Monitoring of Structures Using Minimal Instrumentation
Nestor Polanco, Eric Hernandez
3:30 pm – 3:45 pm

T-2-9 – PMC-MS-07: Uncertainty Quantification and Model Verification and Validation in Multiscale Simulation 2:15 PM – 3:45 PM Chairs: Laura Swiler, Kathryn Farrell-Maupin	Location: SC 5312

726: A Survey of Methods for Integration of Uncertainty and Model Form Error in Prediction
Joshua Mullins, Benjamin Schroeder, Richard Hills
2:15 pm – 2:30 pm

580: Representing Model Error in Reduced Combustion Mechanisms: A Stochastic Operator Approach
Rebecca Morrison, Robert Moser, Todd Oliver
2:30 pm – 2:45 pm

171: Estimation and Rectification of Model-Form Errors in Transonic Reynolds-Averaged Navier Stokes Simulations
Sophia Lefantzi, Jaideep Ray, Srinivasan Arunajatesan, Lawrence Dechant
2:45 pm – 3:00 pm

438: Uncertainty Quantification for Multi-Scale Mortar Discretizations
Tim Wildey, Bart van Bloemen Waanders
3:00 pm – 3:15 pm

688: Process Parameter Uncertainty in Additive Manufacturing of Metals
John Turner, Naren Raghavan, Sudarsanam Babu, Wael Elwasif, Ryan Dehoff
3:15 pm – 3:30 pm

42: Variance Reduction Approaches for Random Materials Homogenization
Frederic Legoll
3:30 pm – 3:45 pm

T-2-10 - PMC-MS-11: Objective Resilience in Engineering Mechanics 2:15 PM – 3:45 PM Chairs: Mohammed Ettouney, Simos Gersasimidis	Location: FGH-JH 298

17: Long Wave Instability for Progressive Collapse of Tall Steel Moment Frames
Simos Gerasimidis, Mohammed Ettouney
2:15 pm – 2:30 pm

34: Multifunctional Nano-Enhanced Materials for Infrastructure Protection
Ahmed Al-Ostaz, Xiaobing Li, Hunain Alkhateb, Alexander Cheng
2:30 pm – 2:45 pm

590: Subsurface Damage and Scour Detection Using Deck Level Vibrations to Enhance Highway Bridge Maintenance and Resilience
Amir Irhayyim, Chris Mullen
2:45 pm – 3:00 pm

335: Data-Driven Resiliency Management of Bridges in a Rail Network under Multiple Hazard Exposures
Jerome Lynch, Mohammed Ettouney
3:00 pm – 3:15 pm

206: Measuring and Managing Resiliency in Facilities
Roger Grant
3:15 pm – 3:30 pm

190: Modeling the Interactions between Cyber Capabilities and Critical Infrastructure-Based Societal System Functioning in Disasters
Xilei Zhao, Ian Miers, Matthew Green, Judith Mitrani-Reiser
3:30 pm – 3:45 pm

T-2-11 – PMC-MS-13: Quantification and Propagation of Uncertainty in Engineering Modeling and Design 2:15 PM – 3:45 PM Chairs: Mehdi Modares, Zissimos Mourelatos	Location: SC 5211

185: Issues in Generating Response Surfaces for Reliability Analysis of Large Complex Dynamic Systems
Novonil Sen, Hamoon Azizsoltani, Achintya Haldar
2:15 pm – 2:30 pm

392: Fatigue Reliability of Vibratory Systems Using a Nonlinear Damage Model
Vasiliki Tsianika, Zissimos P. Mourelatos, Monica Majcher
2:30 pm – 2:45 pm

22: An Approach to Quantify Ground Motion Uncertainty for Incremental Dynamic Analysis
Peng Deng, Shiling Pei, John van de Lindt, Hongyan Liu, Chao Zhang
2:45 pm – 3:00 pm

671: Statistical Modelling of Hurricane Trajectories in the North Atlantic Ocean for Structural Integrity and Damage Cost Estimation
Wei Cui, Luca Caracoglia
3:00 pm – 3:15 pm

406: An Interval Approach for Analysis of Structures Subject to Uncertain Displacements
Mehdi Modares
3:15 pm – 3:30 pm

T-2-12 – PMC-MS-16: Bayesian Methods in Uncertainty Quantification and Probabilistic Engineering Design 2:15 PM – 3:45 PM Chairs: Juan M. Caicedo, Zhen Hu	Location: SC 5326

247: Bayesian Calibration of Spatially Varying Model Parameters with High-Dimensional Response
Paromita Nath, Zhen Hu, Sankaran Mahadevan
2:15 pm – 2:30 pm

466: Model Updating of Compressive Strength Constitutive Models for Cement Paste
Yohanna Mejia, Juan M. Caicedo, Fabio Matta
2:30 pm – 2:45 pm

342: Calibration of Input Dependent Parameters in Multi-Fidelity Problems
Ghina Absi, Sankaran Mahadevan
2:45 pm – 3:00 pm

542: A Bayesian Framework for Interactive Design of Staged Excavation Based on MSD
Yingyan Jin, Giovanna Biscontin
3:00 pm – 3:15 pm

T-2-13 – PMC-MS-18: System Reliability Effects in Infrastructure Systems 2:15 PM – 3:45 PM Chairs: Sanjay Arwade, Cristopher Moen	Location: SC 5306

135: Algorithms for Bayesian Network Modeling of Multi-State Infrastructure Flow Systems
Yanjie Tong, Iris Tien
2:15 pm – 2:30 pm

529: Cross-Entropy Based Adaptive Importance Sampling and its Application to High-Dimensional System Reliability Analysis
Ziqi Wang, Junho Song
2:30 pm – 2:45 pm

576: Non-Homogenenous Lévy Processes as a Degradation Model for the Efficient Reliability Estimation of Complex Systems
Javier Riascos-Ochoa, Mauricio Sanchez-Silva, Georgia-Ann Klutke
2:45 pm – 3:00 pm

94: Stochastic Design Optimization Involving Mixed Design Variables by Augmented Polynomial Dimensional Decomposition
Xuchun Ren, Sharif Rahman
3:00 pm – 3:15 pm

431: Treating System Reliability, Redundancy, Risk, and Sustainability as Performance-Based Design and Assessment Requirements in a Life-Cycle Context
Samantha Sabatino, Dan Frangopol
3:15 pm – 3:30 pm

573: System Reliability Analysis of Wood-Sheathed Cold-Formed Steel Diaphragm Subsystems
Aritra Chatterjee, Cristopher D. Moen, Sanjay R. Arwade, Benjamin W. Schafer
3:30 pm – 3:45 pm

PARALLEL SESSIONS 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 Chairs: Siu-Kui (Ivan) Au, Babak Moaveni	Location: Buttrick 101

238: Computational Health Monitoring of 3D Concrete Simple T Girders to Identify Objective Health Index Measure
Eric Fletcher, Hayder Rasheed, Yacoub Najjar
4:15 pm – 4:30 pm

154: Damage Assessment of a Two-Story Masonry-Infilled RC Building from Vibration Data
Mingming Song, Seyedsina Yousefianmoghadam, Babak Moaveni, Andreas Stavridis, Richard Wood
4:30 pm – 4:45 pm

188: Damage Detection in Composite Plates Subjected to Large Deformations
Han-Gyu Kim, Richard Wiebe, Michael Motley
4:45 pm – 5:00 pm

273: Smart Monitoring System Based on Electromechanical Impedance and Guided Ultrasonic Waves
Amir Nasrollahi, Vincenzo Gulizzi, Piervincenzo Rizzo
5:00 pm – 5:15 pm

763: Assessing the Structural Health of CFRP I-Beams under Bending: Electrical Resistance Methods and Ultrasonic Sensor Methods
Siavash Peiday Saheli, Brian Pinto, Valeria La Saponara
5:15 pm – 5:30 pm

139: Identification of High-Resolution Vibration Modes of Structures from Video Camera Measurements Only
Yongchao Yang, Charles Dorn, Tyler Mancini, Zachary Talken, Garrett Kenyon, Charles Farrar, David Mascarenas
5:30 pm – 5:45 pm

T-3-2 – EMI-MS-02: Stability and Failure of Structures and Materials 4:15 PM – 5:45 PM Chairs: Jifeng Xu, Pizhong Qiao	Location: FGH-JH 138

79: Vibration Analysis of Delaminated Composite Plates with Perturbation Method
Pizhong Qiao, Hangbin Zhang
4:15 pm – 4:30 pm

71: Local-Global Mode Interaction in Thin-Walled Rectangular Hollow Section Struts
Jiajia Shen, Ahmer Wadee, Adam Sadowski
4:30 pm – 4:45 pm

556: Buckling and Postbuckling Analysis of Hat-Stringer-Stiffened Composite Panels
Dongyun Ge, Yuming Mo, Boling He, Xuzhen Du, Bo Wang
4:45 pm – 5:00 pm

372: Buckling and Post-Buckling Analysis of Stiffened Composite Panels under Different Load Conditions
Kan Feng, Lei Peng, Jifeng Xu
5:00 pm – 5:15 pm

121: Semi-Analytical Modeling of Post-Critical Delamination Growth in Buckled Composite Plates
Anton Köllner, Christina Völlmecke
5:15 pm – 5:30 pm

51: A Hierarchical Finite Strip Method for Buckling Analysis of Composite Shells
Jifeng Xu, Kan Feng
5:30 pm – 5:45 pm

T-3-3 – EMI-MS-13: Computational Solids and Structural Mechanics: Theoretical and Numerical Applications 4:15 PM – 5:45 PM Chairs: Farid Abed, Alexis Rusinek	Location: FGH-JH 110

575: Assembly of Micro/Nanomaterials into Complex, Three-Dimensional Architectures by Compressive Buckling
Yonggang Huang
4:15 pm – 4:30 pm

82: Crystal Plasticity Finite Element Based Modeling of Deformation-Twinning Induced Failure in Magnesium Alloy
Jiahao Cheng, Somnath Ghosh
4:30 pm – 4:45 pm

92: Experimental and Numerical Analysis of Perforation Process for Selected Aluminum Alloys - Defining Friction Coefficient and Failure Criterion
Maciej Klosak, Amine Bendarma, Alexis Rusinek, Tomasz Jankowiak
4:45 pm – 5:00 pm

102: Deformation and Failure Modeling of Polycrystalline Ti Alloys across a Range of Strain Rates
Xiaohui Tu, Ahmad Shahba, Somnath Ghosh
5:00 pm – 5:15 pm

147: Thermo-Mechanical Description of C45 Steel over a Range of Temperatures and Loading Rates
Farid Abed, Mohammad Saffarini
5:15 pm – 5:30 pm

117: Wave Propagation in Irregular Honeycombs
Tanmoy Mukhopadhyay, Sondipon Adhikari
5:30 pm – 5:45 pm

T-3-4 – EMI-MS-16: Multiphysics and Multiscale Modeling of Engineering Materials 4:15 PM – 5:45 PM Chairs: Yong Rak-Kim, Ahmed Al-Ostaz	Location: FGH-JH 132

743: Atomistic to Continuum Homogenization Method
Ranganathan Parthasarathy, Lizhi Ouyang, Anil Misra
4:15 pm – 4:30 pm

299: Predicting Characteristics of Polymer Blends through a Rigorous Thermodynamical Modeling of Structural Length Scales
Andreas Krischok, Lihua Jin, Christian Linder
4:30 pm – 4:45 pm

365: Multi-Scale Modeling of Mechanical Failure of Lithium-Ion Battery
Chao Zhang, Shriram Santhanagopalan, Michael Sprague, Ahmad Pesaran
4:45 pm – 5:00 pm

366: Multi-Scale Micromechanical Modeling for Electrical Conductivity of Cementitious-Based Composite with Multi-Walled Carbon Nanotubes and Moisture
Sung-Hwan Jang, Daniel Hochstein, Shiho Kawashima, Huiming Yin
5:00 pm – 5:15 pm

485: Image-Based Multi-Scale Modeling and Simulations of High Energy Ball Milled Porous Composites
Alberto Salvadori, Sangmin Lee, Karel Matouš
5:15 pm – 5:30 pm

518: Parallelized Coupling Simulation of a Multiphysical Problem in the Many Integrated Core (MIC) Architecture
Moonho Tak, Taehyo Park
5:30 pm – 5:45 pm

T-3-5 – EMI-MS-19: Computational Geomechanics 4:15 PM – 5:45 PM Chairs: Ronaldo Borja, WaiChing Sun	Location: Buttrick 103

758: Modeling Thermal Softening Effects in Coupled THM Problems at Finite Strain
WaiChing Sun, Claudio Tamagnini, Federica Ronchi
4:15 pm – 4:30 pm

676: Computational Cryo-Mechanics for Frozen Soil
SeonHong Na, WaiChing Sun
4:30 pm – 4:45 pm

611: On Performance of Implicit Integration for a Micropolar Critical State Model
Majid Manzari, Karma Yonten
4:45 pm – 5:00 pm

627: On Performance of Elements in the Finite Element Analysis of Strain Localization in Granular Soils Using Micropolar Constitutive Model
Karma Yonten, Majid Manzari
5:00 pm – 5:15 pm

692: Non Equilibrium Thermodynamics of Fault Gouge: Effect of Grain Contact Processes
Ahmed Elbanna
5:15 pm – 5:30 pm

214: Numerical and Experimental Study of Fluid-Particle Flow
Lu Jing, Fiona Kwok, Andy Leung
5:30 pm – 5:45 pm

T-3-6 – EMI-MS-26: Recent Advances in Rocking Isolation 4:15 PM – 5:45 PM Chairs: Nicos Makris	Location: FGH-JH 244

455: Seismic Response Analysis of Slender, Free-Standing Columns and the Competing Effects of Size and Slenderness
Nicos Makris, Georgios Kampas
4:15 pm – 4:30 pm

56: Experimental Verification of Common Assumptions Used in the Analysis of the Rocking Motion of Rigid Bodies
Raphael Greenbaum, Andrew Smyth, Manolis Chatzis
4:30 pm – 4:45 pm

554: A Preliminary Study of the Rocking Response of Artifacts Subjected to Sound Induced Vibrations
Manolis Chatzis, Maria Garcia Espinosa
4:45 pm – 5:00 pm

478: Experimental Study for a Double Skin Façade Damper System
Rui Zhang, Tat Fu
5:00 pm – 5:15 pm

T-3-7 – EMI-MS-37: Computational Modeling in Civil Engineering 4:15 PM – 5:45 PM Chairs: Juan Caicedo, Andre Barbosa	Location: SC 4309

294: Nonlinear Finite Element Model Updating and Seismic Response Reconstruction of Marga-Marga Bridge During the Mw 8.8 Maule, Chile Earthquake
Yong Li, Rodrigo Astroza, Joel Conte
4:15 pm – 4:30 pm

626: Study of a Long Span Railroad Truss Bridge Using the Finite Element Model and Experimental Testing
Ramesh Malla, Surendra Baniya, Suvash Dhakal, David Jacobs
4:30 pm – 4:45 pm

391: Numerical Evaluation of the Effects of Strain Localization and Asymmetric Damage Distribution on Damaged Rope Response
Juan Beltran, Ramirez Nicolas
4:45 pm – 5:00 pm

452: Development of a Regional Performance-Based Seismic Assessment Framework for California's Highway Bridges
Barbaros Çetiner, Ertuğrul Taciroğlu
5:00 pm – 5:15 pm

696: Finite Element Modeling for Optimal Design of Bridge Pot Bearings
Najib Bouaanani, Kimiya Zakikhani, Tarik Fethi Saichi
5:15 pm – 5:30 pm

181: Tsunami-Induced Forces on Bridge Components
Andrew Winter, Michael Motley, Marc Eberhard
5:30 pm – 5:45 pm

T-3-8 – EMI-MS-39: Modeling of Grain Boundaries and Grain Boundary-Driven Mechanics 4:15 PM – 5:45 PM Chairs: Brandon Runnels, Irene Beyerlein	Location: FGH-JH 211

85: Quantitative Inference of Failure Conditions for Individual Grain Boundaries
Matteo Seita, John P. Hanson, Silvija Gradecak, Michael Demkowicz
4:15 pm – 4:30 pm

41: 3D Modeling of Grain Boundaries Using a Fully-Nonlocal and High-Performance Realization of the Quasicontinuum Method
Ishan Tembhekar, Dennis Kochmann
4:30 pm – 4:45 pm

40: A Mesoscale Model of Grain Boundary Faceting: The Role of Facet Junctions
Fadi Abdeljawad, Douglas Medlin, Jonathan Zimmerman, Khalid Hattar, Stephen Foiles
4:45 pm – 5:00 pm

272: Alloying Effects on Grain Boundary Motion and Microstructure Evolution
Stephen Foiles, Fadi Abdeljawad, Christopher O'Brien
5:00 pm – 5:15 pm

151: Modeling Anisotropic Grain Boundary Energy and Morphology in Polycrystal-Level Simulations
Brandon Runnels
5:15 pm – 5:30 pm

T-3-9 – PMC PANEL SESSION: The Role of Uncertainty in Modeling Resilience 4:15 PM – 5:45 PM Chair: Lori Graham-Brady Panelists: Mohammed Ettouney, Mohammed Ettouney LLC John van de Lindt, Colorado State University Hiba Baroud, Vanderbilt University Jamie Padgett, Rice University	Location: SC 4327

Wednesday, May 25, 2016

8:00am–9:00am	Plenary Lecture – Student Life Center, Ballroom									
9:00am–9:30am	Coffee Break – Student Life Center & Featheringill-Jacobs Hall									
9:30am–11:30am EMI Sessions	EMI-MS-13	EMI-MS-32	EMI-MS-15	EMI-MS-40	EMI-MS-10	EMI-MS-07	EMI-MS-14	EMI-MS-01	EMI-MS-22	EMI-MS-38
	Featheringill-Jacobs 110	Featheringill-Jacobs 132	Featheringill-Jacobs 134	Featheringill-Jacobs 136	Featheringill-Jacobs 138	Featheringill-Jacobs 211	Featheringill-Jacobs 244	Buttrick Hall 101	Buttrick Hall 103	Stevenson Center 5211
9:30am–11:30am PMC Sessions	PMC-MS-17	PMC-MS-18	PMC-MS-09	PMC-MS-12						
	Featheringill-Jacobs 298	Stevenson Center 5306	Stevenson Center 5312	Stevenson Center 5326						
11:30am–1:00pm	Lunch – Rand Dining Hall									
1:00pm–2:00pm	Plenary Lecture – Student Life Center, Ballroom									
2:15pm–3:45pm EMI Sessions	EMI-MS-03	EMI-MS-17	EMI-MS-15	EMI-MS-41	EMI-MS-43	EMI-MS-18	EMI-MS-19	EMI-MS-37		
	Featheringill-Jacobs 110	Featheringill-Jacobs 132	Featheringill-Jacobs 134	Featheringill-Jacobs 138	Featheringill-Jacobs 211	Featheringill-Jacobs 244	Buttrick Hall 103	Stevenson Center 4309		
2:15pm–3:45pm PMC Sessions	PMC-MS-17	PMC-MS-04	PMC-MS-19	PMC-MS-08						
	Featheringill-Jacobs 298	Buttrick Hall 101	Stevenson Center 5306	Stevenson Center 5312						

PLENARY LECTURE

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

Otis Walton, Lawrence Livermore National Laboratory
Wednesday, May 25, 2016
8:00am – 9:00am
Student Life Center, Ballroom
Session Chair: Mourad Zeghal, Rensselaer Polytechnic Institute

Abstract

Dr. Walton plans to review the history of MD and DEM simulation development and point out both similarities and differences between those related numerical methods. This talk will include a description of the modes of motion and degrees of freedom associated with the contact forces in granular materials – features that (along with particle shape and size distributions) ultimately control the bulk behavior of assemblies of mesoscopic particles. The approximate models usually used to simulate the physical interactions will be covered along with gotchas that often occur. In addition to a comparison of the historical development of both molecular-dynamics (MD) and discrete-element method (DEM) simulation approaches, the results of recent DEM simulations of granular solids in unusual engineering environments that show some somewhat unexpected behavior will be described, along with others that verify some old theories of granular mechanics.

Biographical Sketch

Otis joined LLNL as a full time employee shortly after receiving his Masters in Physics at UC Davis in 1968, while continuing his graduate studies at UCD, part-time. His early LLNL research involved simulation and testing of rapid deposition of energy, and shock physics, especially in porous materials, and including MD simulations of nano-scale porosity – with guidance from Bill Hoover. In the mid-1970's he started developing DEM models, similar to Peter Cundall's 'Rigid Block Model', for use in designing Oil Shale retorting equipment. His PhD thesis in 1980, and his research for the next 2-decades, involved development and application of various DEM algorithms and codes, especially examining rapid granular flows in the grain-inertia regime (originally described by Bagnold, and later modeled by the granular kinetic theories of Savage and Jenkins). Many of Dr. Walton's models and codes were transferred to universities and industry. In the late 1990's he spent 3-years as a Thrust Leader at the University of Florida's Engineering Research Center for Particle Technology, and then 3-years as Associate Director of Powder Technology at Nektar Therapeutics (working on pulmonary delivery of pharmaceutical ingredients). For the past decade he has been back at LLNL (at least 1/2 – time) and has also continued studies of granular mechanics for NASA through his small business, Grainflow Dynamics, examining engineering challenges of dealing with granular solids under reduced gravity conditions.

PLENARY LECTURE

Structural Health Monitoring: Past, Present and Future
Achintya Haldar, University of Arizona
Wednesday, May 25, 2016
1:00 pm – 2:00 pm
Student Life Center, Ballroom
Session Chair: Douglas Adams, Vanderbilt University

Abstract
Structural health assessment, monitoring, and management have attracted interdisciplinary research interest. Infrastructures are deteriorating, some of them are beyond their design life, or they are being exposed to extreme events like strong earthquakes, high winds, or man-made explosions. Due to shortage of resources to replace them, it is now necessary to extend their design life without exposing public to unnecessary risk. One attractive option is to inspect the infrastructures thoroughly in a timely manner without disrupting their normal operation to identify the defect locations, quantify their severity and then take appropriate remedial actions for continued useful service. Researchers from many different disciplines are developing inspection methods, necessary sensors and their optimal implementation in field conditions, and data collection, fusion and analysis techniques. Some of the concepts are based on the structural behavior at the time of inspection. They are offline and/or online. In spite of many significant developments, their applications to assess the health of existing infrastructures have been limited. The speaker and his team members have conducted extensive theoretical, analytical, and experimental investigations, identified several challenges, and proposed solutions and implementation strategies. Combining sensor data with finite element analysis, the structural health can be assessed, in terms of locations and severity of damage, by tracking the stiffness properties of the elements and comparing them with observations in past inspections, if available, or using information from the design and drawings, or studying deviations from other elements with similar properties. The information can be extracted from the signatures embedded in a few noise-contaminated acceleration time histories measured at small segments of the structure, only for very short durations and even without the excitation information. Different Kalman filter-based algorithms have been significantly advanced. The presentation will address recent developments, ongoing challenges, and implementation issues that still need to be addressed, based on the speaker's recent research supported by the U.S. NSF (CMMI-1403844).

Biographical Sketch
Dr. Haldar conducts research on risk and reliability applied to many branches of engineering. He developed the stochastic finite element concept, several novel approaches for structural health assessment, and is now working on developing a new engineering design paradigm supported by the NSF. He has advised a large number of graduate students, authored a large body of research publications, and received numerous awards for research and teaching. He is a Distinguished Member of ASCE and a Fellow of SEI.

PARALLEL SESSIONS – WEDNESDAY, MAY 25

PARALLEL SESSIONS 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 Chairs: Eleni Chatzi, Eric Hernandez	Location: Buttrick 101

734: Fundamental Two-Stage Formulation for Bayesian System Identification
Siu-Kui (Ivan) Au, Feng-Liang Zhang
9:30 am – 9:45 am

386: A Discontinuous Unscented Kalman Filter for Non-Smooth Problems
Manolis Chatzis, Eleni Chatzi
9:45 am – 10:00 am

328: Strategies to Tackle the Dimensionality Issue for Nonlinear Bayesian Filtering and Parameter Identification
Audrey Olivier, Andrew Smyth
10:00 am – 10:15 am

296: An Experimental Study on Finite Element Model Updating for a Pedestrian Bridge Considering Temperature Effects
Shanglian Zhou, Wei Song
10:15 am – 10:30 am

63: Experimental Model Updating with Frequency Response Function Considering Damping Effect
Yu Hong, Yang Wang
10:30 am – 10:45 am

248: Optimal Sequential Sensor Placement for Fatigue Damage Monitoring of Structures
Eric Hernandez
10:45 am – 11:00 am

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, Jian Li
11:00 am – 11:15 am

783: A Texture-Based Video Processing Framework for Autonomous Crack Detection on Metallic Surfaces
Fu-Chen Chen, Mohammad Jahanshahi
11:15 am – 11:30 am

W-1-2 – EMI-MS-07: Blast and Ballistic Impact Resistance of Materials and Structures 9:30 AM – 11:30 AM Chairs: William F. Heard, Prodyot K. Basu	Location: FGH-JH 211

604: Mixed-Field Meshfree Method for Modeling Munitions Penetration in Soils
Sheng-Wei Chi, Thanakorn Siriaksorn, Ashkan Mahdavi
9:30 am – 9:45 am

747: Modeling Projectile Penetration Mechanics in a Meshfree Computational Framework
M. J. Roth, J. S. Chen, J. A. Sherburn, T. R. Slawson, M. C. Hillman
9:45 am – 10:00 am

47: An Investigation of Numerical Approaches for Analyzing Structural Response under Blast Loads
Mason Hickman, Prodyot K. Basu
10:00 am – 10:15 am

700: Impact Response of Steel and Aluminum Foams
Sanjay Arwade, Ignacio Cetrangolo, Andrew Rock, Nima Rahbar
10:15 am – 10:30 am

103: Approach to Blast Resistant Design of Urban Steel Structures with Little or No Stand-Off Distance
Yongwook Kim, Joseph Donato, Michael McBrien
10:30 am – 10:45 am

653: Breach Behavior of Soil-Filled Barriers Due to Blast
Catherine S. Stephens, Omar G. Flores, Donald H. Nelson, Robert E. Walker, R. Nicholas Boone
10:45 am – 11:00 am

75: Blast Resistance of Concrete Protective Cladding with/without Cutouts
Mohammed Alaloula, Prodyot K. Basu
11:00 am – 11:15 am

321: Long Duration Blast Loading and Debris Distribution of Masonry Structures
Simon Clubley, Richard Keys
11:15 am – 11:30 am

W-1-3 - EMI-MS-10: Modeling and Characterization of Quasibrittle Fracture 9:30 AM – 11:30 AM Chair: Jia-Liang Le	Location: FGH-JH 138

332: From Diffuse Damage to Sharp Cohesive Cracks: A Coupled XFEM Framework for Failure Analysis of Quasi-Brittle Materials
Yongxiang Wang, Haim Waisman
9:30 am – 9:45 am

748: A Damage Analysis for Brittle Materials Using Stochastic Micro-Structural Information
J.S. Chen, Shih-Po Lin
9:45 am – 10:00 am

153: Probabilistic Modeling of Failure of Polycrystalline Silicon MEMS Structures
Roberto Ballarini, Jia-Liang Le
10:00 am – 10:15 am

376: Scaling of Fracturing Behavior of Graphene Reinforced Polymers: Experimental Characterization and Modeling
Cory Hage, Marco Salviato
10:15 am – 10:30 am

169: Subcritical Crack Growth Induced by Coupled Chemo-Mechanical Attack in Hardened Cement Paste
Weijin Wang, Teng Tong, Qiang Yu
10:30 am – 10:45 am

282: Cohesive Crack Analysis of Size Effect for Samples with Blunt and Sharp Notches
Gianluca Cusatis, Giovanni Di Luzio
10:45 am – 11:00 am

741: Transition from Ductile Shear to Brittle Tensile Failure Mode in Scratch Testing of Rocks
Emmanuel Detournay, Jia-Liang Le
11:00 am – 11:15 am

581: Lattice Discrete Particle Modeling of Shear Failure in Reinforced Concrete Beams without Stirrups
Sina Khodaie, Fabio Matta, Mohammed Alnaggar
11:15 am – 11:30 am

W-1-4 – EMI-MS-13: Computational Solids and Structural Mechanics: Theoretical and Numerical Applications 9:30 AM – 11:30 AM Chairs: Alexis Rusinek, Lizhi Sun	Location: FGH-JH 110

68: Numerical Analysis on Continuous Impact Behavior of Cohesionless Soil with FEM-SPH Coupling Algorithm
Weizhou Zhong, Yuming Yang, Zhiming Hao, Xianjun Liu, Zhifang Deng
9:30 am – 9:45 am

469: Micromechanical Characterization and Modeling of Mechanical Property of Long-Term Aged Asphalt Binder Based on Inclusion Based Boundary Element Method
Gan Song, Huiming Yin
9:45 am – 10:00 am

621: New Approach to Damage Mechanics through a Modified Finite Element Framework
Parisa Khodabakhshi, J.N. Reddy, Arun Srinivasa
10:00 am – 10:15 am

394: Stabilized Methods for Coupled Thermomechanical Effects in Multi-Constituent Materials
Harishanker Gajendran, Arif Masud
10:15 am – 10:30 am

389: A Coupled DPD/DEM Model Towards Functionally Graded Material Fabrication by a Combined Vibration and Sedimentation Method
Chensen Lin, Zhenyu Shou, Fangliang Chen, Huiming Yin
10:30 am – 10:45 am

408: Micromechanics-Based Elastoplastic Behavior of Functionally Graded Materials with Particle Interactions
Qiliang Lin, Fangliang Chen, Huiming Yin
10:45 am – 11:00 am

500: Computational Design of Interconnected, Polymer Composites for Impact Resistant Applications
Muhammed Imam, Trisha Sain
11:00 am – 11:15 am

W-1-5 – EMI-MS-14: Advances in Experimental, Theoretical and Computational Fracture Mechanics 9:30 AM – 11:30 AM Chair: Ange-Therese Akono	Location: FGH-JH 244

257: Fracture Mechanisms of Microparticulate Composites via Macroscopic Scratch Testing
Gregory A. Bouche, Ange-Therese Akono
9:30 am – 9:45 am

569: Multi-Scale Experimental Chemo-Mechanical Testing on Quartz: From Elasticity to Fracture
Christian Hoover, Jeremie Berthonneau, Mathieu Bauchy, Olivier Grauby, Alain Baronnet, Roland Pellenq, Franz-Josef Ulm
9:45 am – 10:00 am

374: Applications of Mixed Mode Fracture Criteria for Cement Mortar and Asphalt Binder
MirMilad Mirsayar, Philip Park
10:00 am – 10:15 am

640: Experimental Investigation into the Deformation and Failure of a Magnesium Alloy under Dominant Shear Loading
Khashayar Farzanian, Ali Ghahremaninezhad
10:15 am – 10:30 am

456: Risk of Fracture at Early Ages: A Criterion for Cutting Pavement Joints
Arghavan Louhghalam, Franz-Josef Ulm
10:30 am – 10:45 am

287: Investigation of Bone Fragility at Microscopic Length Scales
Amrita Kataruka, Kavya Mendu, Okeoghene Orieka, Ange-Therese Akono
10:45 am – 11:00 am

W-1-6 - EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics 9:30 AM – 11:30 AM Chairs: C. Armando Duarte, Yuri Bazilevs	Location: FGH-JH 134

345: Eigenstrain Based Reduced Order Homogenization for Polycrystalline Materials
Xiang Zhang, Çağlar Oskay
9:30 am – 9:45 am

503: A Comparison between the Finite Element Method and Material Point Method in Mesoscale Crystal Plasticity Simulations
Brian Phung, Ashley Spear, Rebecca Brannon, Brian Leavy
9:45 am – 10:00 am

205: Primal Method for GND-Based Kinematic Hardening Model
Omar Nassif, Timothy Truster
10:00 am – 10:15 am

91: The Adaptive Wavelet Enhancement of the Crystal Plasticity Finite Element Method
Yan Azdoud, Jiahao Cheng, Somnath Ghosh
10:15 am – 10:30 am

106: A Preliminary Computational Investigation of the Efficacy of a Concept for Smart Material, Adaptive, and Reconfigurable (SMART) Building Surface Tiles
Robert Zupan, Richard Beblo, Dale Clifford, John Brigham
10:30 am – 10:45 am

780: Are the Cohesive Zone Models Necessary for Delamination Analysis?
Zifeng Yuan, Jacob Fish
10:45 am – 11:00 am

245: A Numerical Approach to Describe Failure of Wood - From the Wood Cell Level up to Wood-Based Products
Markus Lukacevic, Josef Füssl, Josef Eberhardsteiner
11:00 am – 11:15 am

W-1-7 – EMI-MS-22: Granular Materials: Deformation, Flow, Phase Transitions, and Multi-Scale Modeling 9:30 AM – 11:30 AM Chairs: Matthew Kuhn, A. Douadji	Location: Buttrick 103

131: From Discrete Particles to Continuum Fields
Thomas Weinhart
9:30 am – 9:45 am

233: Multi-Scale Modelling of Segregating Granular Flows
Anthony Thornton
9:45 am – 10:00 am

447: Effects of Centrifuge Testing Condition on the Dynamic Response of a Dry Sandy Slope
Bo Li, Mourad Zeghal
10:00 am – 10:15 am

658: Micro-Polar Discrete-Continuum Coupling Method for Fluid-Infiltrating Porous Media
Kun Wang, WaiChing Sun
10:15 am – 10:30 am

722: Grainsize Effects in the Comminution of Granular Materials: A Micromechanical Interpretation
Yida Zhang, Giuseppe Buscarnera, Itai Einav
10:30 am – 10:45 am

733: Experimental Inference of Inter-Particle Contact Forces in Granular Media under Shear Deformation
Eloïse Marteau, Jose Andrade
10:45 am – 11:00 am

756: Grain Size-Effect in Granular Micromechanics
Payam Poorsolhjouy, Anil Misra
11:00 am – 11:15 am

W-1-8 – EMI-MS-32: Topology Optimization; Algorithms and Applications 9:30 AM – 11:30 AM Chairs: Alireza Asadpoure, Mazdak Tootkaboni	Location: FGH-JH 132

591: Robust Design of Ultra-Dissipative Metamaterials via Stochastic Topology Optimization
Alireza Asadpoure, Mazdak Tootkaboni
9:30 am – 9:45 am

429: Topology Optimization of Geometrically Nonlinear Trusses with Critical Load Constraint
Lei Li, Kapil Khandelwal
9:45 am – 10:00 am

776: Nonlinear Topology Optimization Considering Plasticity through an Asymptotic Approach: A Polygonal Element Formulation
Tuo Zhao, Adeildo Ramos Jr., Glaucio Paulino
10:00 am – 10:15 am

165: Design of Bi-Stable Airfoil Using Topology Optimization
Anurag Bhattacharyya, Kai A. James
10:15 am – 10:30 am

577: Robust Lattice Architectures with Improved Stability Performance
Mazdak Tootkaboni, Alireza Asadpoure, Lorenzo Valdevit
10:30 am – 10:45 am

381: A Gradient Based Polynomial Chaos Approach for Topology Optimization under Uncertainty
Vahid Keshavarzzadeh, Daniel Tortorelli
10:45 am – 11:00 am

777: Tensegrity Topology Optimization on Ground Structures
Ke Liu, Glaucio Paulino
11:00 am – 11:15 am

W-1-9 – EMI-MS-38: Quantitative Engineering Sustainability: Model Development and Data Analytics 9:30 AM – 11:30 AM Chairs: Arghavan Louhghalam, Marta Gonzalez	Location: SC 5211

457: Impact of Vehicle Speed and Traffic Flow on Pavement-Vehicle Interaction Emissions at the Network Level
Arghavan Louhghalam, Mazdak Tootkaboni, Marta Gonzalez, Franz-Josef Ulm
9:30 am – 9:45 am

482: Quantitative Assessment of Pavement Use Phase Impacts on Vehicle Fuel Consumption
Mehdi Akbarian, Arghavan Louhghalam, Franz-Josef Ulm
9:45 am – 10:00 am

314: Modeling Agents and Environments at the Built-Human Interface
Paul Torrens
10:00 am – 10:15 am

687: Urban Heat Island: City Texture Matters
Jake Sobstyl, Mohammad Javad Abdolhosseini Qomi, Thorsten Emig, Roland Pellenq, Franz-Josef Ulm
10:15 am – 10:30 am

319: Sustainability Score for Urban Systems
Ruda Zhang, Roger Ghanem
10:30 am – 10:45 am

140: City-Scale Structural Health Monitoring by Wide-range Video Camera Sensing and Novel Computer Vision
Yongchao Yang, Charles Farrar, David Mascarenas
10:45 am – 11:00 am

327: Sequential Damage Localization: A Data-driven Approach
Yizheng Liao, Anne Kiremidjian, Ram Rajagopal
11:00 am – 11:15 am

558: Detecting Building Occupancy with Vibration Sensors and Machine Learning
Roya Cody, Shounak Mitra, Tat Fu, Sriram Narasimhan, Nicholas Kirsch
11:15 am – 11:30 am

W-1-10 – EMI-MS-40: Advanced Numerical Methods in Computational Biomechanics 9:30 AM – 11:30 AM Chairs: Ming-Chen Hsu, Dominik Schillinger	Location: FGH-JH 136

677: Computational Fluid Dynamics Simulation of Potential Risk Factors in a Mouse Model of Pediatric Cerebrovascular Disease
Shaolie Hossain, Travis Sanders, Zbigniew Starosolski, Dianna Milewicz, Ananth Annapragada
9:30 am – 9:45 am

628: Cardiac Isogeometric Simulations Using Cubic Hermite Meshes with Extraordinary Nodes
Arian Jafari, Edward Pszczolkowski, Adarsh Krishnamurthy
9:45 am – 10:00 am

571: Discretisation Sensitivity of Voxel-Based Bone Models
Martin Ruess
10:00 am – 10:15 am

346: Adaptive Discretizations for Bone-Implant Systems Using the Finite Cell Method
Mohamed Elhaddad, Nils Zander, John Jomo, Stefan Kollmannsberger, Jan Bauer, Martin Ruess, Ernst Rank
10:15 am – 10:30 am

698: A Computational Framework to Transfer 3D Imaging Data into a Multifield Flow Profile of the Liver
Dominik Schillinger, Peter Mueller, Stein Stoter
10:30 am – 10:45 am

134: A Feasibility Study of a Shape Analysis Based Nondestructive and Noninvasive Material Property Characterization Strategy for the Human Right Ventricle Wall
Jing Xu, Marc Simon, Timothy Wong, Wilkins Aquino, John Brigham
10:45 am – 11:00 am

280: Computational 3D Fluid-Structure Interaction Involving Large Deformations
Ye Chen, Siyuan Chang, Haoxiang Luo
11:00 am – 11:15 am

693: I(mmer)sogeometric Design and Analysis of Artificial Heart Valves
Ming-Chen Hsu, Austin J. Herrema, Josh Mineroff, Michael C. H. Wu, Fei Xu
11:15 am – 11:30 am

W-1-11 – PMC-MS-09: Critical Infrastructure Systems Modeling: Risk, Reliability, and Resilience 9:30 AM – 11:30 AM Chairs: Hiba Baroud, Bilal Ayyub	Location: SC 5312

517: Life-Cycle Reliability Assessment of Corroded RC Bridges under Multiple Hazards
Mitsuyoshi Akiyama, Dan Frangopol, Thanapol Yanweerasak
9:30 am – 9:45 am

159: Probabilistic Modeling of Interdependencies between Critical Infrastructure Systems for Resilience
Chloe Johansen, Iris Tien
9:45 am – 10:00 am

765: Quantifying Resilience-Based Importance Measures Using Bayesian Kernel Methods
Hiba Baroud
10:00 am – 10:15 am

784: Design for Resilience Based on Computational System Reliability Analysis
Zhen Hu, Sankaran Mahadevan
10:15 am – 10:30 am

712: Understanding Interdependencies between Systems towards Resilient Critical Lifeline Infrastructures
Haizhong Wang Wang, Shangjia Dong, Alireza Mostafizi
10:30 am – 10:45 am

562: Building Portfolio Fragility Functions to Support Scalable Community Resilience Assessment and Effective Risk Communication
Peihui Lin, Naiyu Wang
10:45 am – 11:00 am

484: The Impact of Recovery Time on the Lifecycle Performance of Infrastructures Exposed to Multiple Occurrences of Multiple Types of Hazards
Ehsan Fereshtehnejad, Abdollah Shafieezadeh
11:00 am – 11:15 am

7: Influential Parameters on the Probabilistic Seismic Demand Models of Irregular Bridges
Farahnaz Soleimani, Reginald DesRoches, Jamie E. Padgett
11:15 am – 11:30 am

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 Chairs: Hadi Meidani, Arash Noshadravan	Location: SC 5326

723: Redundancy Measures for Deteriorating Structures under Uncertainty
Fabio Biondini, Dan Frangopol
9:30 am – 9:45 am

308: Computing the Value of Information in Sequential Decision Making: An Auction-Based Formulation
Milad Memarzadeh, Matteo Pozzi
9:45 am – 10:00 am

315: Dynamic Modeling of Urban Transportation System with Application to Resilience Planning
Ruda Zhang, Roger Ghanem
10:00 am – 10:15 am

265: Optimizing Sensing Based on Value of Information Using Spatio-Temporal Probabilistic and Network Models of Infrastructure Systems
Carl Malings, Matteo Pozzi
10:15 am – 10:30 am

675: Optimal Deterioration Modeling for Infrastructures
Negin Alemazkoor, Hadi Meidani
10:30 am – 10:45 am

654: A Probabilistic Life-Cycle Assessment for Quantifying the Effect of Design Life and Analysis Period on the Environmental Sustainability of Pavements
Arash Noshadravan
10:45 am – 11:00 am

162: Sustainability Under Multiple Hazard Exposure: Life-Cycle Analysis for Bridges
Navya Vishnu, Jamie Padgett
11:00 am – 11:15 am

W-1-13 – PMC-MS-17: Modeling Resilient Infrastructure 9:30 AM – 11:30 AM Chairs: Paolo Gardoni, Gaofeng Jia	Location: FGH-JH 298

64: Mechanical Behavior for Submarine Pipelines Crossing Active Strike-Slip Fault
Longjun Xu, Qingyang Liu
9:30 am – 9:45 am

132: Resilience Quantification through Various Detection Indices of SHE^TM
Elizabeth K. Ervin, Ethan R. B. Baker
9:45 am – 10:00 am

378: A Stochastic Formulation to Model Resilience of Engineering Systems
Neetesh Sharma, Paolo Gardoni, Armin Tabandeh
10:00 am – 10:15 am

539: Optimal Design for Future Uncertainty with Adaptable Infrastructure
Olga Špačková, Daniel Straub
10:15 am – 10:30 am

614: Modeling Resilient Infrastructure Combining Physical Damage and Loss and Restoration of Functionality: The Case of a Water Network
Roberto Guidotti, Hana T. Chmielewski, Paolo Gardoni, Therese P. McAllister
10:30 am – 10:45 am

710: Modelling Post-Earthquake Recovery and Resilience of the Electric Power Supply Systems in Nepal
Max Didier, Aike Steentoft, Siddhartha Ghosh, Bozidar Stojadinovic
10:45 am – 11:00 am

313: Examining the Dependencies of a School Building on Critical Physical Infrastructure for a Community Subjected to Tornado
Hassan Masoomi, John van de Lindt
11:00 am – 11:15 am

732: A Wearable Wireless Sensor Network for Emergency Cases in Buildings Using a Customized Structural Health Monitoring System
E. Sheikhi, G.P. Cimellaro
11:15 am – 11:30 am

W-1-14 – PMC-MS-18: System Reliability Effects in Infrastructure Systems 9:30 AM – 11:30 AM Chairs: Cristopher Moen, Sanjay Arwade	Location: SC 5306

396: Design Component and System Reliability in Low-Rise Cold Formed Steel Framed Commercial Buildings
Brooks Smith, Sanjay Arwade, Benjamin Schafer, Cristopher Moen
9:30 am – 9:45 am

397: Benefits of Load Redistribution to the Capacity of a Simple Cold-Formed Steel Floor System
Brooks Smith, Sanjay Arwade, Benjamin Schafer, Cristopher Moen
9:45 am – 10:00 am

470: System reliability of Cold-Formed Steel Framed Shear Walls
Guanbo Bian, Aritra Chatterjee, Stephen Buonopane, Sanjay Arwade, Cristopher Moen, Benjamin Schafer
10:00 am – 10:15 am

574: Modeling of Pipeline Corrosion Deterioration Mechanism with a Lévy Process Based on ILI (In-Line) Inspections
Rafael Amaya, Javier Riascos-Ochoa, Felipe Muñoz-Giraldo, Mauricio Sánchez-Silva
10:15 am – 10:30 am

781: Six Sigma-based Robust Design Optimization of Prestressed Girder Bridges
Yassin Al-Delaimi, Elena Dragomirescu
10:30 am – 10:45 am

764: Efficient Multiline anchor systems for floating offshore wind turbines
Casey Fontana, Sanjay Arwade, Don DeGroot, Charles Aubeny, Melissa Maynard, Andrew Meyers
10:45 am – 11:00 am

PARALLEL SESSIONS 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 Chairs: Eleni Chatzi, Babak Moaveni	Location: Buttrick 101

363: Vibration-Based Health Monitoring of Wind Turbine Blades under Operational Uncertainties
Yaowen Ou, Eleni Chatzi, Vasilis Dertimanis, Minas Spiridonakos
2:15 pm – 2:30 pm

197: Dense Array of Soft Elastomeric Capacitors for Feature Extraction on Wind Turbine Blades
Austin Downey, Simon Laflamme
2:30 pm – 2:45 pm

460: Analytical Study of Structural Damage Detection Using Stochastic Subspace Identification and Finite Element Model Updating
Li Yang, Young Hoon Kim
2:45 pm – 3:00 pm

77: Structural Identification and Modeling of a Three-Story School Building Damaged During the 2015 Gorkha Earthquake
Wen Yu Chang, Amin Nozari, Mohammad Shafiqual Alam, Andreas Stavridis, Babak Moaveni, Andre Barbosa, Richard Wood
3:00 pm – 3:15 pm

302: Image Processing for Damage Diagnosis and Uncertainty Quantification
Yanqing Bao, Sankaran Mahadevan
3:15 pm – 3:30 pm

W-2-2 – EMI-MS-03: Robustness of Infrastructures (Progressive Collapse) 2:15 PM – 3:45 PM Chairs: Simos Gerasimidis, George Deodatis	Location: FGH-JH 110

125: New Euler-Type Progressive Collapse Curves for 3D Steel Frames
Panagiotis Pantidis, Simos Gerasimidis
2:15 pm – 2:30 pm

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, Kang Hai Tan
2:30 pm – 2:45 pm

412: Analytical Evaluation on the Effect of Damage Location on Collapse Performance of Reinforced Concrete Perimeter Frames
Jorge Rivera, Sergio Breña, Simos Gerasimidis
3:00 pm – 3:15 pm

578: The Role of Interior Gravity Columns on Blast-Induced Progressive Collapse Potential of Tall Buildings
Jenny Sideri, Christopher L. Mullen, Simos Gerasimidis, George Deodatis
3:15 pm – 3:30 pm

87: Effect of Creep on the Behavior of Flush Endplate Connections at Elevated Temperatures
Ahmad El Ghor, Elie Hantouche, Mohammad Ali Morovat
3:30 pm – 3:45 pm

W-2-3 – EMI-MS-15: Computational Methods and Applications for Solid and Structural Mechanics 2:15 PM – 3:45 PM Chair: Ashley Spear	Location: FGH-JH 134

353: A Non-Local Gradient-Enhanced Damage Model for Viscoelastic Materials
Juan G. Londono, Luc Berger-Vergiat, Haim Waisman
2:15 pm – 2:30 pm

383: Multi-Yield Surface Modelling of Viscoplastic Materials
Hao Yan, Çağlar Oskay
2:30 pm – 2:45 pm

12: A Continuum Model for Additively Manufactured Lattice Meta-Materials
Mark Messner, Holly Carlton, Mathew Barham, Mukul Kumar, Nathan Barton
2:45 pm – 3:00 pm

606: Reproducing Kernel Collocation Method for the Phase-Field Fracture Model
Ashkan Mahdavi, Sheng-Wei Chi
3:00 pm – 3:15 pm

116: Modeling of the Mechanical Properties of CNTs Reinforced Concrete Based on Element-Free MLS Method
Jianfei Wang, K.M. Liew
3:15 pm – 3:30 pm

W-2-4 – EMI-MS-17: Modeling the Mechanics of Material Surfaces and Interfaces 2:15 PM – 3:45 PM Chairs: Chandrasekhar Annavarapu, Timothy Truster	Location: FGH-JH 132

53: A Nitsche Method for Wave Propagation Problems and its in Time Domain
Ting Song, Guglielmo Scovazzi
2:15 pm – 2:30 pm

292: A Variable Density Model for Water Air Structure Interaction Problems
Kaspar Mueller, Michael Motley
2:30 pm – 2:45 pm

349: Embedded Interface Problems with Quadratic X-FEM: A Nitsche Approach
Wen Jiang, Yingjie Liu, Chandrasekhar Annavarapu
2:45 pm – 3:00 pm

368: An Elasto-Plastic Constitutive Model for Monotonic and Cyclic Behaviour of Gravel-Structure Interface
Miad Saberi, Charles-Darwin Annan, Ali Lashkari, Jean-Marie Konrad
3:00 pm – 3:15 pm

99: On the Parametric Sensitivity of Cohesive Zone Models for High-Cycle Fatigue Delamination of Composites
Stephen Jimenez, Ravindra Duddu
3:15 pm – 3:30 pm

W-2-5 – EMI-MS-18: High-Performance Infrastructure through Nano- and Microstructured Materials 2:15 PM – 3:45 PM Chair: Marcus Rutner	Location: FGH-JH 244

680: Joining of Cu-Nb Multilayered Nanocomposites
Majid Ramezani Goldyani, Marcus Rutner
2:15 pm – 2:30 pm

432: Length-Scale Effect on Wave Propagation in Periodic Micro-Lattices
Ryan Alberdi, Kapil Khandelwal
2:30 pm – 2:45 pm

501: Carbon Nanotube-Reinforced Structural Composites Enabled by the PopTube Approach
William Guin, Jialai Wang
2:45 pm – 3:00 pm

W-2-6 – EMI-MS-19: Computational Geomechanics 2:15 PM – 3:45 PM Chairs: Jose Andrade, Richard Regueiro	Location: Buttrick 103

202: Hierarchical Upscaling to Inform Continuum Constitutive Models of Soils
Erik Jensen, Richard Regueiro
2:15 pm – 2:30 pm

213: Multi-Scale Investigation of Damage-Fluid Flow in Porous Media with Cemented Microstructure
Mahdad Eghbalian, Richard Wan
2:30 pm – 2:45 pm

737: Discrete Element Modeling of Heat Transfer in Granular Systems with Experimental Insight
Jason Marshall, Jose Andrade
2:45 pm – 3:00 pm

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, Richard Regueiro, Eric Herbold, Michael Homel
3:00 pm – 3:15 pm

668: Staggered Schemes for Multiscale Arlequin Poromechanics Problems
WaiChing Sun, Zhijun Cai
3:15 pm – 3:30 pm

350: On Efficient and Robust Numerical Bifurcation Analysis of Fluid-Saturated Porous Geomaterials
Qiushi Chen, Zhengshou Lai
3:30 pm – 3:45 pm

W-2-7 – EMI-MS-37: Computational Modeling in Civil Engineering 2:15 PM – 3:45 PM Chairs: Andre Barbosa, Pedro Arduino	Location: SC 4309

80: Performance-Based Design of Inundated Coastal Structures
Trung Do, John van de Lindt, Daniel Cox
2:15 pm – 2:30 pm

289: Infill Strut Model Class Uncertainty of Seismic Response of Reinforced Concrete Masonry Infilled Frames
Mohammad S. Alam, Andre R. Barbosa
2:30 pm – 2:45 pm

2: Determination of Stresses in Step-Wise Cylindrical Steel Storage Tanks Under Hydrostatic Loading
Eyas Azzuni, Sukru Guzey
2:45 pm – 3:00 pm

223: Assessment of Collapse Status of 220kV Guyed Portal Transmission Tower Subjected to Extreme Wind Loads
Huawei Niu, Wei Zhang, Xugang Hua
3:00 pm – 3:15 pm

268: Modeling of Groups of Standing People over a Structure Using a Closed Loop Controller Model
Albert R. Ortiz, Juan M. Caicedo
3:15 pm – 3:30 pm

361: Modeling of Leadership Behavior with an Extended Social Force Model for Crowd Evacuation in Buildings
Yi Ma, Richard Kwok Kit Yuen, Eric Wai Ming Lee
3:30 pm – 3:45 pm

W-2-8 – EMI-MS-41: Inverse Problems for Tomographic Imaging and Remote Sensing Applications in Engineering 2:15 PM – 3:45 PM Chair: Fabio Semperlotti	Location: FGH-JH 138

76: A Functionally Layered Sensing Skin for Structural Health Monitoring
Mohammad Pour-Ghaz, Milad Hallaji, Aku Seppänen
2:15 pm – 2:30 pm

483: Strain and Damage Identification in Piezoresistive Nanocomposites Using Electrical Impedance Tomography with Constrained Sine-Wave Solutions
Tyler Tallman
2:30 pm – 2:45 pm

362: Active Elastic-Wave Imaging of Heterogeneous Fractures: From Geometric Reconstruction to Interfacial Characterization
Fatemeh Pourahmadian, Bojan Guzina
2:45 pm – 3:00 pm

318: Damage Detection and Localization Using Multifunctional Cement Composites and Electrical Impedance Tomography
Sumit Gupta, Jesus Gonzalez, Kenneth Loh, Rongzong Wu, Navneet Garg
3:00 pm – 3:15 pm

260: Vibration Based Benchmark Problem for Human Activity Recognition
Ramin Madarshahian, Juan M. Caicedo
3:15 pm – 3:30 pm

370: Heavy Tailed Distributions in Diffused Wave-Fields: A New Tool for Imaging through Scattering Media?
Salvatore Buonocore, Mihir Sen, Fabio Semperlotti
3:30 pm – 3:45 pm

W-2-9 – EMI-MS-43: Recent Advances in Real-time Hybrid Simulation 2:15 PM – 3:45 PM Chairs: Wei Song, Richard Christenson	Location: FGH-JH 211

422: Effective Implementation of Real-time Hybrid Simulation: Stability and Performance
Amin Maghareh, Shirley Dyke
2:15 pm – 2:30 pm

298: Experimental Study on a Discrete-Time Compensation Technique for Real-time Hybrid Simulation
Wei Song, Saeid Hayati
2:30 pm – 2:45 pm

486: An Improved Displacement Control Algorithm for Real-Time Hybrid Simulation
Yunbyeong Chae, Chul-Young Kim
2:45 pm – 3:00 pm

636: An Explicit Numerical Integration Algorithm for Force-Based Hybrid Simulation
Bahareh Forouzan, Narutoshi Nakata
3:00 pm – 3:15 pm

769: Distributed Real-Time Hybrid Simulation of Connected Base Isolated Buildings Author Information
F. Avci; F. Peña; R.E. Christenson, S.J. Dyke; E.A. Johnson
3:15 pm – 3:30 pm

W-2-10 – PMC-MS-08: Earthquake Hazards and Beyond: Opportunities for Integrating Geosciences and Engineering 2:15 PM – 3:45 PM Chair: Ting Lin	Location: SC 5312

351: Probabilistic Assessment of Regional Liquefaction-Induced Settlement through Multiscale Random Field Models
Chaofeng Wang, Qiushi Chen, C. Hsein Juang
2:15 pm – 2:30 pm

400: Engineering Validation of Simulated Ground Motions for Building Damage Assessment
Alexandra Tsioulou, Carmine Galasso
2:30 pm – 2:45 pm

536: Time-Dependent Seismic Fragility models of RC buildings for Aging Considerations
Zengping Wen, Fei Geng
2:45 pm – 3:00 pm

579: Multi-Field Meshfree Method for Landslide Simulations
Thanakorn Siriaksorn, Sheng-Wei Chi
3:00 pm – 3:15 pm

186: Probabilistic Seismic Performance of Dry Cask Structures under Strong Ground Motions
Majid Ebad Sichani, Jamie Padgett
3:15 pm – 3:30 pm

W-2-11 – PMC-MS-17: Modeling Resilient Infrastructure 2:15 PM – 3:45 PM Chairs: Paolo Gardoni, Gaofeng Jia	Location: FGH-JH 298

312: Resilience and Dependency Modeling of Critical Civil Infrastructures Using Graph Theory and Dynamic Inoperability Input-Output Model
Xian He, Eun Jeong Cha
2:15 pm – 2:30 pm

199: Resilience-Based Risk Mitigation and Recovery for Highway Transportation Networks
Weili Zhang, Naiyu Wang, Charles Nicholson
2:30 pm – 2:45 pm

255: Integrating Water and Electric Systems in a Post-Earthquake Fire Analysis
Negar Elhami Khorasani, Maria Garlock
2:45 pm – 3:00 pm

262: A Hybrid Algorithm to Solve the Time-Dependent Interdependent Network Design Problem
Andrés D. González, Leonardo Dueñas-Osorio, Andrés L. Medaglia, Mauricio Sánchez-Silva
3:00 pm – 3:15 pm

286: The Critical Role of Interdependency in Infrastructure Resilience to Natural Hazards
Dorothy Reed, Vipin Unnikrishnan, John van de Lindt, Paolo Gardoni, Shuoqi Wang
3:15pm – 3:30 pm

731: A New Methodology to Model Interdependency of Critical Infrastructure Systems during Hurricane Sandy's Event
Pietro Crupi, Anil Agrawal, Gian Paolo Cimellaro
3:30 pm – 3:45 pm

W-2-12 – PMC-MS-19: Characterization, Simulation, and Modeling of Random Heterogeneous Materials 2:15 PM – 3:45 PM Chairs: Michael Shields, Johann Guilleminot	Location: SC 5306

136: Mitigating Mesh Dependence of Stochastic Finite Element Analysis of Quasibrittle Fracture
Jia-Liang Le, Jan Elias
2:15 pm – 2:30 pm

270: Fracture Analysis of a Quasi-Brittle Material Based on a Random Field Representation of Micro-Cracked Domain
Reza Abedi, Philip L. Clarke, Omid Omidi, Pavan Kumar
2:30 pm – 2:45 pm

425: The Influence of Random Microstructure on Wave Propagation through Heterogeneous Media
Inna Gitman, Yilang Song
2:45 pm – 3:00 pm

701: Stochastic Simulation of Random Material Microstructures Using Ellipsoidal Growth Structures
Nicolas Venkovic, Lori Graham-Brady
3:00 pm – 3:15 pm

2016 ASCE/EMI AWARD RECIPIENTS

2016 Maurice A. Biot Medal
Ronaldo I. Borja, Ph.D., A.M.ASCE
Stanford University

Prof. Borja is the 2016 Maurice A. Biot Medal recipient for his significant contributions to the development of theoretical and computational framework for saturated and unsaturated porous media, and for brining to light the role of finite deformation and heterogeneity on the localization of deformation of porous materials.

2016 Jack E. Cermak Medal
Qiusheng Li, Ph.D.
City University of Hong Kong (CityU)

Prof. Li is the 2016 Jack E. Cermak Medal recipient for his many contributions to wind engineering that range from fundamental to applied research.

2016 Alfred M. Freudenthal Medal
Bruce R. Ellingwood, Ph.D., P.E., F.SEI, Dist.M.ASCE, NAE
Colorado State University

Prof. Ellingwood is the 2016 Alfred M. Freudenthal Medal recipient for the unique
role that he has played in introducing concepts of probability, statistics and structural reliability to structural engineering and for transforming structural reliability from academic research specialty into a mainstream of structural engineering practice.

2016 Nathan M. Newmark Medal
Mircea D. Grigoriu, Ph.D., F.EMI, F.ASCE
Cornell University

Prof. Grigoriu is the 2016 Nathan M. Newmark Medal recipient for original theoretical contributions to uncertainty quantification and their applications to earthquake/wind engineering and material science.

2016 Robert H. Scanlan Medal
Yukio Tamura, D.Eng., F.EMI, M.ASCE
Tokyo Polytechnic University

Prof. Tamura is the 2016 Robert H. Scanlan Medal recipient for fundamental contributions to mathematical modeling, quantification, and analysis of wind effects on buildings and structures.

2016 Theodore von Karman Medal
Ares J. Rosakis, Ph.D., A.M.ASCE
California Institute of Technology (Caltech)

Prof. Rosakis is the 2016 Theodore von Karman Medal recipient for discovering several fundamental physical phenomena in dynamic fracture of heterogeneous materials and interfaces at various length and time scales.

2016 Zdeněk P. Bažant Medal for Failure and Damage Prevention
Subra Suresh, Sc.D., NAE
Carnegie Mellon University

Prof. Suresh is the 2016 Zdenek P. Bazant Medal for Failure and Damage Prevention recipient for his pioneering work on failure and damage prevention of metallic and composite materials under cyclic and other loadings.

2016 EMI Leonardo da Vinci Award
Matthieu Vandamme, Ph.D., AM.ASCE
Laboratoire Navier, Ecole des Ponts et Chaussées

Prof. Vandamme is the 2016 EMI Leonardo da Vinci Award recipient for his Mechanics-Based, Science-Driven Innovation in poromechanics relevant for Civil Engineering Applications in the service of the big societal problems: global warming, infrastructure sustainability and energy storage.

2015 Masanobu Shinozuka Medal
Jann N. Yang, Ph.D., P.E., F.ASCE
University of California, Irvine

Prof. Yang is the 2015 Masanobu Shinozuka Medal recipient for sustained research and teaching on stochastic dynamics, control, fatigue, and identification of structural components and systems.

The Community for Leaders in Engineering Mechanics

Advancing the Frontiers of Engineering

JOIN

- **Direct EMI membership.** EMI membership is open to all engineering mechanics professionals for $80 annually.
- **Already an ASCE member?** You can join EMI at no extra charge, if it is your first institute, or $30 each year if it is your second institute.

BENEFITS

Member Discounts on:

- EMI Publications including – *The Journal of Engineering Mechanics, The Journal of Nanomechanics and Micromechanics, Lecture Notes in Mechanics, and Trends in Engineering Mechanics Special Publication*
- EMI conferences, workshops, webinars, and short courses

Other:

- Complimentary subscription to the EMI monthly e-newsletter
- Eligibility for serving on an EMI Technical Committee
- Eligibility for voting in the EMI Elections

AWARDS AND MEDALS

- Zdeněk P. Bažant Medal for Failure and Damage Prevention
- Maurice A. Biot Medal
- Jack E. Cermak Medal
- Alfred M. Freudenthal Medal
- George W. Housner Medal
- Raymond D. Mindlin Medal
- Nathan M. Newmark Medal
- Robert H. Scanlan Medal
- Masanobu Shinozuka Medal
- Theodore von Karman Medal
- The EMI Leonardo da Vinci Award

UPCOMING EMI CONFERENCES

- 2016 EMI International Conference-France, October 25 - 27, 2016. Université de Lorraine, Ile du Saulcy, Metz, France
- 2017 EMI International Conference – Brazil, March 19-22, 2017, Rio De Janeiro, Brazil
- EMI 2017, San Diego, CA, USA, June 4-7, 2017

http://www.asce.org/emi/

SPONSORS

ASCE | INFRASTRUCTURE RESILIENCE

EMI 1687 ASCE ENGINEERING MECHANICS INSTITUTE

SEI ASCE STRUCTURAL ENGINEERING INSTITUTE

USACM

VANDERBILT SCHOOL OF ENGINEERING

Vanderbilt University, Science & Engineering