March 17, 2022

ANNUAL REPORT TO THE EMI MEMBERSHIP FOR FY 2021

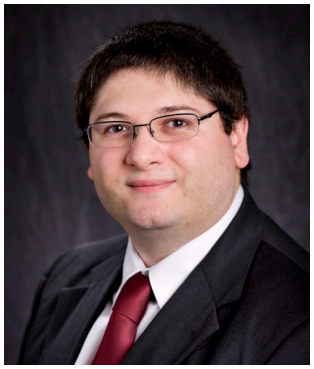
The Engineering Mechanics Institute of ASCE, established on October 1, 2007, is organized under the American Society of Civil Engineers, a 501 (c) (3) non-profit association created in 1852. The purpose of this report is to present to the EMI membership a summary of the Institute's activities and progress during the period of October 1, 2020 to September 30, 2021 (FY 2021), as specified by article 9.3.1 of the EMI bylaws:

"*Additional Duties of the President*. The President, on behalf of the Board of Governors, shall prepare and distribute to the membership an Annual Report for the preceding fiscal year".

GOVERNANCE

Over the spring and summer 2020, EMI conducted an election for two open positions on the EMI Board of Governors, starting on October 1, 2020. Michele Barbato, Ph.D., P.E., M.ASCE, F.SEI, F.EMI (University of California Davis) and Arif Masud, Ph.D., F.EMI, M.ASCE (University of Illinois at Urbana-Champaign) were elected by the EMI membership to serve a three-year term. Pol Spanos, Ph.D., P.E., NAE, F.EMI, Dist.M.ASCE (Rice University) and George Deodatis, Ph.D., F.EMI, M.ASCE (Columbia University) served as FY 2021 EMI President and Past President, respectively. Christian Hellmich, Ph.D., F.EMI, M.ASCE (Vienna University of Technology) served as the FY 2021 Treasurer, and Sankaran Mahadevan, Ph.D., F.EMI, M.ASCE (Vanderbilt University) served as the FY 2021 Vice-President.

Welcome to the new EMI Governors, and many thanks to Elisabeth Malsch for her years of dedicated service on the EMI Board of Governors!



Michele Barbato, Ph.D., P.E., M.ASCE, F.SEI, F.EMI

George Deodatis, Ph.D., F.EMI, M.ASCE, *Past President*

Christian Hellmich, Ph.D., F.EMI, M.ASCE, *Treasurer*

Sankaran Mahadevan, Ph.D., F.EMI, M.ASCE, *Vice-President*

Elisabeth Malsch, Ph.D., P.E., M.ASCE

Arif Masud, Ph.D., F.EMI, M.ASCE

Pol Spanos, Ph.D., F.EMI, NAE, Dist.M.ASCE, *President*

Ertugrul Taciroglu, Ph.D., F.EMI, M.ASCE

The EMI Board of Governors oversees the Institute's four Divisions:

Administrative Division

- Awards Committee
- Nominating Committee

Publications Division

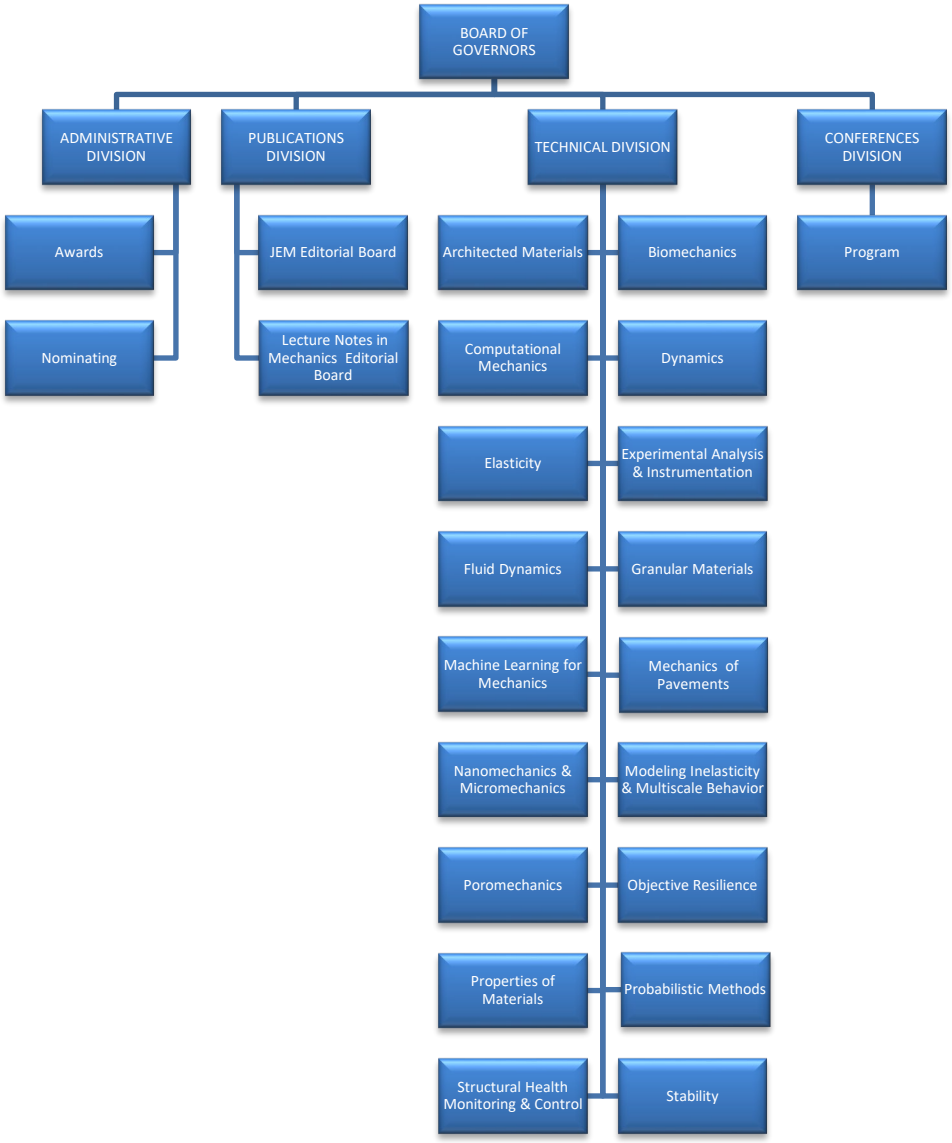
- Editorial Board of the *Journal of Engineering Mechanics*
- Editorial Board of *Lecture Notes in Mechanics*

Technical Division

- Architected Materials Committee
- Biomechanics Committee
- Computational Mechanics Committee
- Dynamics Committee
- Elasticity Committee
- Experimental Analysis & Instrumentation Committee
- Fluid Dynamics Committee
- Granular Materials Committee
- Machine Learning for Mechanics
- Mechanics of Pavements Committee
- Modeling Inelasticity & Multiscale Behavior Committee
- Nanomechanics and Micromechanics Committee
- Objective Resilience Committee
- Poromechanics Committee
- Probabilistic Methods Committee
- Properties of Materials Committee
- Stability Committee
- Structural Health Monitoring & Control Committee

Conferences Division

- Program Committee



EMI Organizational Chart

MEMBERSHIP

There are two ways of becoming an EMI member: members can join ASCE and select EMI as one of their Institutes (ASCE/EMI membership), or they may choose to be members of EMI only (EMI-only membership). EMI membership provides member discounts on EMI publications (25%), EMI journals subscriptions (75%), and EMI conference and webinar registrations; the ability to nominate members for elected positions on the EMI Board of Governors, to be a candidate and to vote in EMI elections, and to

apply to join EMI technical committees; a subscription to the EMI newsletter; and access to valuable resources and information on the EMI website.

Membership dues had been kept at the same level since the start of EMI in FY 2008. Following approval by the EMI Board of Governors, EMI-only membership dues were increased in FY 2018 to $100 per calendar year. EMI-only membership for full-time graduate student members is no longer offered, as students can join ASCE and select an Institute such as EMI for free. Membership in EMI is free for ASCE members choosing EMI as their first Institute and $30 after the first Institute.

An annual dues discount based upon the yearly World Bank World Development Indicators is provided to members residing in certain countries. On-line membership applications are available for ASCE/EMI membership, ASCE/EMI student membership, and EMI-only membership.

EMI pursued its efforts to attract and retain younger members through free membership for students, student competitions, and the prestigious EMI Leonardo da Vinci award. EMI membership has grown to about 2,150. About 29% of the EMI members reside outside the U.S. (64 countries). Over 90% of the EMI members are in academia or research, and about 15% are students. EMI counts 18 Distinguished/Honorary Members of ASCE and 22 NAE members among its members.

PUBLICATIONS

EMI is proud of its publications which help disseminate important emerging knowledge and engage the membership of the Institute.

Prof. Roberto Ballarini, Ph.D., P.E., F.EMI, Dist.M.ASCE (University of Houston) has served as the Editor of the monthly *Journal of Engineering Mechanics* (JEM), the flagship journal of EMI, since the fall of 2012. JEM continues to demonstrate extraordinary progress as one of the premier mechanics journals. All the journal statistics show a marked improvement over the past five years. There has been an increase in submissions and in papers published annually, a reduction in acceptance rate, and a strong increase in impact factor from 0.787 in 2007 when EMI was established to an all-time high of 2.62 in 2020, and a decrease in the time to first decision time (80 days on average). With these substantial improvements in the journal performance measures, JEM has become one of the most prestigious mechanics journals. Prof. Ballarini also made a particular effort to diversify the editorial board by recruiting associate editors from minority groups. Currently, the Editorial Board has seven female members. He also recruited associate editors from several other countries, thus greatly enhancing JEM's international visibility.

Several Special Collections have been published in JEM:

Recent advances on the mechanics of masonry structures (Guest Editors: Vasilis Sarhosis Vasilis Sarhosis, University of Leeds; Katalin Bagi, Budapest University of Technology and Economics; Gabriele Milani, Technical University of Milan, and Jose Lemos)

EMI Conference Student Competition Finalist Papers (Guest Editors: Michele Barbato, University of California Davis and Alexandros Angelos Taflanidis, University of Notre Dame)

Granular Media and Systems across Scales: New Challenges for Experiments and Computation (Guest Editors: Mahdia Hattab, Université de Lorraine and Antoinette Tordesillas, University of Melbourne)

Prof. Ballarini stepped down as Editor-in-Chief of JEM after 9 years. The EMI Board of Governors appointed Prof. Franz-Josef Ulm (M.I.T.) to replace him.

EMI is also preparing a set of *Manuals of Practice on Objective Resilience* edited by Dr. Mohammed Ettouney, Chair of the EMI Objective Resilience Committee. This initiative resulted in 31 chapters written by 50 authors. It is planned that the MOPs will be published by ASCE in March 2022 as four books titled:

Objective Resilience: Policies and Strategies, MOP 146
Objective Resilience: Objective Processes, MOP 147
Objective Resilience: Technology, MOP 148
Objective Resilience: Applications, MOP 149

CONFERENCES

EMI 2021 Conference

EMI had planned to hold its EMI 2020 Conference and its 2020 Probabilistic Mechanics and Reliability Conference on the campus of Columbia University in New York City from May 26 to May 29, 2020. The event was to be chaired by Shiho Kawashima, Ioannis Kougioumtzoglou, Steve Waiching Sun, Haim Waisman, (all of Columbia University), Elisabeth Malsch (Thornton Tomasetti), and George Deodatis (Columbia University).

Due to the COVID-19 pandemic which made travel and large gatherings impossible at that time, the event was postponed to 2021 and was held as the EMI PMC 2021 conference, a virtual event, on May 25-28, 2021.

The EMI PMC 2021 conference featured six live plenary lectures by leading researchers:

Katia Bertoldi, Ph.D., Wyss Institute, Harvard University: Multistable Structures – From Energy Trapping to Morphing

Ronaldo I. Borja,Ph.D., Stanford University, The Poromechanics of Shale

Jie Li, Ph.D., Tongji University, Physical Stochastic System: A New Perspective on Objective World

Elisa E. Konofagou, Ph.D., Columbia University: Imaging Cardiovascular Mechanics for Disease Diagnosis

Arif Masud, Ph.D., F.EMI, University of Illinois at Urbana-Champaign: Hierarchical Variational Methods for Coupled-Field Problems, Data Driven Modeling, and Error Estimation

Mircea D. Grigoriu, Ph.D., F.EMI, Cornell University: Data-based estimates of extreme rare events in dynamical systems.

The recording of these lectures are posted on the EMI website at https://www.asce.org/communities/institutes-and-technical-groups/engineering-mechanics-institute/news/emi-pmc-2021-conference-plenary-presentations.

In addition, the conference featured 665 pre-recorded video-presentations by speakers in 28 countries in concurrent technical presentation mini-symposia and sessions (see the list of sessions and mini-symposia at https://www.emi-conference.org/sites/emi-conference.org/2022/files/inline-files/EMI-PMC2021-MS%20Sessions_%2005182021.pdf).

On the occasion of the EMI PMC 2021 Conference, nine EMI Technical Committees organized student paper competitions which were held on-line:

EMI Dynamics Committee Student Paper Competition
EMI Modeling Inelasticity & Multiscale Behavior Committee Student Competition
EMI Objective Resilience Committee Student Competition
EMI Poromechanics Student Poster Competition
EMI Probabilistic Methods Committee Student Paper Competition
EMI Structural Health Monitoring and Control Committee Student Paper Competition
EMI Structural Stability Student Paper Competition
EMI Computational Mechanics Committee Student Poster Competition.

Although the EMI PMC conference had to be postponed, the EMI Board of Governors, all the EMI Technical Committees, and the Editorial Board of the Journal of Engineering Mechanics met via Zoom in May and June 2021. The nine student competitions were also held on-line prior to the conference.

The winners of the **nine student competitions** received certificates:

1. Computational Mechanics Committee Student Paper Competition
   (Professor John Brigham, *Chair*)

Winner: **Nathan Shauer** (University of Illinois Urbana-Champaign) "*Simulation of Wave Propagation in Fluid-filled Fractures within a GFEM Framework*"

Runner Ups: **Longzhen Wang** (University of Nebraska-Lincoln) "*Connections Between Peridynamics and Graph Laplacian for Diffusion Problems*"

and **Fei Fan** (The University of Hong Kong) "*Phase-field Modeling of Shear Fracture in Geomaterials*"

2. Dynamics Committee Student Paper Competition
   (Professor Manolis Chatzis, *Chair*)

1st Place: **Aikaterini Kyprioti** (University of Notre Dame) "*Kriging Surrogate Modeling for Approximating EDP Distributions under Stochastic Ground Motion Excitations"*

2nd Place: **Pu Ren** (Northeastern University) "*PhyCRNet: Physics-informed Convolutional-Recurrent Network for Solving Spatiotemporal PDEs*"

and **Fernando Gomez** (The University of Illinois at Urbana-Champaign) "*Topology optimization of tall buildings subjected to stochastic wind excitation"*

3rd Place: **Ehsan Osloub** (University at Buffalo) "*Nonlinear Dynamic Analysis of Electrical Conductors Interconnecting High-Voltage Substation Equipment*"

3. Elasticity Student Paper Competition
   (Professor Evgueni Filipov, *Chair*)

Winner: **Sansit Patnaik** (Purdue University) *"Fractional Order Kinematic Approach to Nonlocal Elasticity*"

4. Modeling Inelasticity & Multiscale Behavior Committee Student Paper Competition
   (Professor Yong-Rak Kim, *Chair*)

1st Place: **Jinlei Shen** (Johns Hopkins University) "*Microstructure-informed Fatigue Crack Nucleation Prediction for Dual Phase Ti-64 Alloys using Experimentally validated Parametrically Homogenized Constitutive Models"*

2nd Place: **Preetam Tarafder** (Johns Hopkins University) "*A Finite Deformation Cohesive Zone Enhanced Phase Field Model for Crack Propagation in Multi-phase Microstructures"*

3rd Place: **Damin Xia** (Vanderbilt University) "*Reduced-Order Computational Homogenization for Multiscale Problems with Large Deformation"*

5. Objective Resilience Committee Student Paper Competition
   (Dr. Mohammed Ettouney, *Chair*)

1st Place: **Mohammad Aghababaei** (Texas A & M University) "*An Agent-Based Modeling Approach for Community Resilience Assessment Accounting for System Interdependencies: Application on Education System"*

2nd Place: **Ahmed Akl** (McMaster University) "*Seismic Robustness of Low-Rise Concrete Infrastructure Systems"*

3rd Place: **Zachary Bunn, Joshua Burns, and Julia Wyatt** (US Military Academy) "*Performance-Based Design of Reinforced Concrete Members Subject to Blast Loading"*

6. Poromechanics Committee Student Poster Competition
   (Professor Maryam Shakiba, *Chair*)

Winner: **Yidong Zhao** (The University Hong Kong) "*Stabilized Material Point Methods for Large Deformation in Fluid-infiltrated Porous Materials*"

Runner Ups: **Omar Rodriguez Villarreal** (Université de Pau et des Pays de l'Adour) "*Estimation of Fracture Energy from Hydraulic Fracture Tests on Mortar and Rocks at Geothermal Reservoir Temperatures*"

and **Mehdi Eskandari-Ghadi** (University of Colorado Boulder) "*Effect of pore size distribution on sorption-induced deformation of porous material*"

7. Probabilistic Methods Committee Student Paper Competition
   (Professor Seymour Spence, *Chair*)

Winners:

Min Li (Colorado State University) "*Generative Adversarial Network Guided Topology Optimization of Periodic Structures via Subset Simulation*"
Bowei Li (University of Michigan) "*A Deep Learning Metamodeling Framework for High-dimensional Nonlinear and Dynamic Structural Systems Subject to Stochastic Excitation*"
Dimitrios Patsialis (University of Notre Dame) "*Multi-fidelity Monte Carlo simulation for efficient seismic risk assessment*"

8. Stability Committee Student Paper Competition
   (Professor Stylianos Yiatros, *Chair*)
   1st Place: **Dr. Adam Bekele** (Imperial College London)
   "*Enhancing Energy Absorption through metamaterial instabilities*"
   2nd Place: **Luke Lapira** (Imperial College London)
   "*Nonlinear modelling of hyperbolic paraboloid plates under pure shear*"

9. Structural Health Monitoring and Control Committee Student Paper Competition
   (Professor Fernando Moreu, *Chair*)
   1st Place: **Reza Sheibani** (University of Utah) "*Prediction of Hurricane-Related Power Outage with a Population-Based Structural Health Monitoring Approach*"
   2nd Place: **Kyle Leland Hom** (Columbia University) "*Damage Identification Using x-Vectors for Structural Health Monitoring*"
   3rd Place: **Jingxiao Liu** (Stanford University) "*Hierarchical model transfer between bridges for multi-task damage diagnosis using drive-by vehicles*"

At the awards ceremony of the EMI PMC 2021 conference, the winners of the 2020 and 2021 ASCE and EMI awards were recognized:

2020 Awards

Zdeněk P. Bažant Medal for Failure and Damage Prevention

Prof. Ares J. Rosakis Ph.D., NAS, NAE, M.ASCE (Caltech) has been selected for " *groundbreaking contributions to earthquake mechanics, specifically for inventing laboratory earthquakes which have transformed our understanding of failure and damage processes in the earth, that have proven central to infrastructure damage prevention.* "

Maurice A. Biot Medal

Prof. Colin Atkinson Ph.D., FRS (Imperial College) has been selected " *for outstanding contributions to the development of fundamental mathematical solutions to problems in fracture mechanics of fluid-saturated porous media and linking these contributions to the successful applications in energy resources recovery sectors worldwide*."

Jack E. Cermak Medal (*Joint with the Structural Engineering Institute of ASCE)*

Peter J. Vickery, Ph.D., P.E., F. SEI, F. ASCE (Applied Research Associates, Inc.) has been selected " *for his*

contributions in the development of hurricane hazard models for risk analysis and for his major impact on the development of building codes and standards in North America. "

Alfred M. Freudenthal Medal

Prof. Dan M. Frangopol, Sc.D., P.E., F. SEI, F. EMI, Dist. M.ASCE (Lehigh University) has been selected " *for outstanding contributions to the advancement of probabilistic, reliability and risk methods in civil engineering, particularly in developing probabilistic models for life-cycle performance assessment, maintenance and optimum management of civil infrastructure systems in diverse loading environments* ."

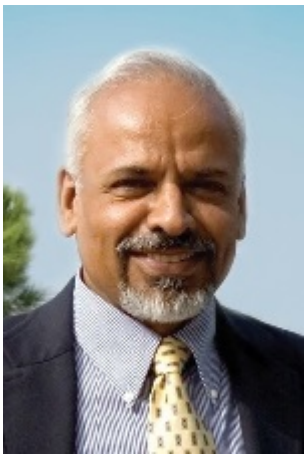
George W. Housner Structural Control and Monitoring Medal

Prof. Yozo Fujino Ph.D., M.ASCE (Yokohama National University) has been selected " *for pioneering research in the development and implementation of structural monitoring and control systems in large-scale structures, as well as for his commitment to developing innovative education programs for students* ."

Raymond D. Mindlin Medal

Prof. Glaucio H. Paulino, Ph.D., F.EMI, M.ASCE (Georgia Tech) has been selected " *for pioneering contributions to the field of mechanics, including geometric mechanics associated to origami and tensegrity engineering, which led to the creation of multifunctional structures and configurational metamaterials with unprecedented properties* ."

Theodore von Kármán Medal



Prof. Katepalli R. Sreenivasan, Ph.D., NAS, NAE (New York University) has been selected " *for lasting scientific contributions to diverse fluid dynamical topics from cryogenics to solar convection, especially the dynamics and mixing of turbulence in laboratory, computational and terrestrial flows, and vast impact on scholarship, scientific development and education in many countries*."

Nathan M. Newmark Medal *(Joint with the Structural Engineering Institute of ASCE)*

Prof. Satish Nagarajaiah, Ph.D., P.E., F. SEI, F. ASCE (Rice University) has been selected " *for the development of nonlinear dynamic analysis techniques for base isolated structures, development of adaptive stiffness systems, negative stiffness systems, smart tuned mass dampers, and for sparse structural system identification techniques and laser based non-contact strain sensing using nanomaterials*."

Robert H. Scanlan Medal

Prof. Qiu-Sheng Li, Ph.D., P.E., M.ASCE (City University of Hong Kong) has been selected " *for outstanding contributions to wind engineering and structural mechanics from fundamental research to engineering applications* ."

EMI Leonardo da Vinci Award

Prof. Mija Hubler, Ph.D., M.ASCE, M.EMI (University of Colorado Boulder) has been selected "*for pioneering breakthroughs in the understanding of toughness of materials due to microstructure feature arrangement, and innovations in experimental methods to study concrete fragmentation, surface characterization, and aging* ."

Walter L. Huber Civil Engineering Research Prizes

Prof. Michele Barbato, Ph.D., C.Eng., P.E., F.EMI, F.SEI, M.ASCE (University of California Davis) has been selected *"for his outstanding research in structural engineering and engineering mechanics, with emphasis on finite element response sensitivity analysis, seismic response steel-concrete composite systems, seismic pounding mitigation, performance-based hurricane engineering and hurricane hazard mitigation, nonstationary stochastic dynamics, multi-hazard performance-based engineering, and sustainable construction materials."*

Prof. Eleni Chatzi, Ph.D., A.M.ASCE (ETH Zürich) has been selected *"for seminal contributions to enable the vision of self-aware infrastructure."*

James R. Croes Medal

Mehrdad Aghagholizadeh, Ph.D., P.E. (Southern Methodist University)

and

Nicos Makris, Ph.D., C.Eng, M.ASCE (Southern Methodist University)

Have been selected for the paper "Effect of Supplemental Hysteretic and Viscous Damping on Rocking Response of Free-Standing Columns," *Journal of Engineering Mechanics*, May 2020.

2021 Awards

Maurice A. Biot Medal

Stein Sture, Ph.D., Hon.D.GE, F.EMI, Dist.M.ASCE (University of Colorado Boulder) has been selected *"for his contributions to experimental, theoretical and computational mechanics for advancing the understanding of mechanical behavior of geologic and particulate media under general stress state including failure."*

Jack E. Cermak Medal (*Joint with the Structural Engineering Institute of ASCE)*

Gregory A. Kopp, Ph.D., P.E., M.ASCE (Western University, Ontario) has been selected *"for his many*

contributions in wind engineering through research and development of wind load standards of buildings and the NIST aerodynamic database."

George W. Housner Structural Control and Monitoring Medal

Hui Li, Ph.D., Aff.M.ASCE (Harbin Institute of Technology) has been selected *"for pioneering research in the development and implementation of structural monitoring and control systems in large-scale structures, as well as for her commitment to developing innovative education programs for students."*

Raymond D. Mindlin Medal

Marco Amabili, Ph.D., P.Eng., M.ASCE (McGill University) has been selected *"for outstanding research contributions to applied solid mechanics, with special emphasis on theoretical, numerical and experimental studies on nonlinear mechanics and large-amplitude vibrations of shells and plates."*

Theodore von Kármán Medal

Fabrizio Vestroni (Sapienza University of Rome) has been selected *"for the stellar and unique career in*

academy and research, professional practice and leadership in academic administration for the benefit of generations of civil engineers."

Masanobu Shinozuka Medal

Mario Di Paola, A.M.ASCE (University of Palermo) has been selected *"for important and numerous contributions to stochastic systems dynamics with emphasis on analytical methods and emerging concepts, and multifaceted applications to civil engineering and other diverse themes, with superb pedagogical leadership and devotion."*

EMI Leonardo da Vinci Award

Ange-Therese Akono, Ph.D., A.M.ASCE (Northwestern University) has been selected *"for discovering novel methods to probe the fracture toughness at the nanoscale, for outstanding discoveries at the intersection of Fracture Mechanics and Nanotechnology, and for inspiring a new generation of nanoscientists and Fracture Mechanics experts ."*

Walter L. Huber Civil Engineering Research Prizes

Alexandros A. Taflanidis, Ph.D., A.M.ASCE (University of Notre Dame) has been selected *"for enhancing the resilience of communities to natural hazards such as hurricanes and earthquakes through decision-support tools and comprehensive risk assessment frameworks that leverage the integration of advanced statistical computing and machine learning methods."*

Ning Lin, Ph.D., A.M.ASCE (Princeton University) has been selected *"for research that has led to significant advances in understanding risks associated with hurricanes and their impact on coastal infrastructure ."*

Norman Medal

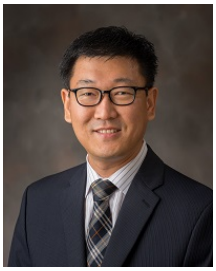
Ning Lu, Ph.D., F.EMI, F.ASCE (Colorado School of Mines)

and

Chao Zhang, Ph.D., A.M.ASCE (Hunan University)

have been selected for the paper "Unified Effective Stress Equation for Soil," published in the *Journal of Engineering Mechanics*, February 2020.

EMI also elected in 2021 **four new EMI Fellows** who were recognized at the award ceremony of the EMI PMC 2021 Conference:



Yong-Rak Kim, Ph.D., F.EMI, M.ASCE (Texas A&M University)

Jerome Lynch, Ph.D., F.EMI, M.ASCE (University of Michigan)

Brett Sanders, Ph.D., EIT, F.EMI, A.M.ASCE (University of California Irvine)

Zhanping You, Ph.D., P.E., F.EMI, F.ASCE (Michigan Technological University)

EMI 2021 International Conference

EMI had planned to hold its EMI 2020 International Conference on the campus of Durham University in Durham, UK on April 5-8, 2020. With travel and large gatherings prevented by the pandemic at that time, the conference organizers had to postpone the conference. The hope was that by the same time in 2021, the restrictions created by the pandemic would no longer apply. Unfortunately, this was still not the case near the end of 2020, and the decision was made by the EMI Board of Governors to hold the conference as a virtual event on March 22-24, 2021, to provide to the authors of accepted presentations a venue to show their work, get feedback on their research, find out what others in the field are doing, and engage in stimulating discussions with like-minded colleagues. The conference was also intended to be an occasion to strengthen or initiate international collaborations.

The conference was chaired by Prof. John Brigham, Department of Engineering, Durham University, UK, assisted by the members of the Local Organizing Committee: Charles Augarde, Department of Engineering, Durham University, UK, Will Coombs, Department of Engineering, Durham University, UK, Peter Gosling, School of Engineering, Newcastle University, UK, and Enrico Masoero, School of Engineering, Newcastle University, UK

The virtual conference followed the familiar format of EMI conferences, with five live plenary lectures presented by leading researchers:

> **Prof. John Provis** (University of Sheffield): Innovation in cements – can we meet future construction needs sustainably?
> **Prof. Anna Pandolfi** (Politechnico di Milano): A microstructured brittle damage model applied to simulations of laboratory tests and full field hydraulic problems in rocks
> **Prof. Franck Schoefs** (Université de Nantes): Spatial variability in materials: how to assess and to model control and reliability
> **Prof. Caglar Oskay** (Vanderbilt University): Stochastic Multiscale Prediction of Failure Initiation in Polycrystalline Materials
> **Prof. Laura De Lorenzis** (ETH Zürich): Phase-field modeling of brittle fracture: a new paradigm to address multiple solutions.

In addition to the plenary lectures, the conference program included up to six concurrent technical presentation sessions. Playback of the pre-recorded presentations took place in the session "meeting room", and everyone watched the content at the same time. At the end of the playback, the presenters participated in a live Q&A with the session attendees. Although only a fraction of the authors of presentations accepted for the in-person conference at Durham University registered for the virtual event, nearly all the 25 mini-symposia initially scheduled were held as shown in the final program, and

the event was successful. Frequently, the discussion, interaction, and networking among session attendees went past the allotted time and into the breaks.

EMI is pleased to have been able to hold its international conference as a successful virtual event. Congratulations to the members of the Local Organizing Committee, and to Prof. John Brigham who chaired the conference!

Upcoming Conferences

The EMI 2022 annual conference will be held in-person in Baltimore, Maryland by The Johns Hopkins University on May 31-June 3, 2022. It is planned that future EMI International Conference will be held at Ghent University in Ghent, Belgium in early 2023 and at Tsinghua University in Beijing, China in October 2023, assuming travel and large gatherings are possible again.

AWARDS

New Award Selection Process

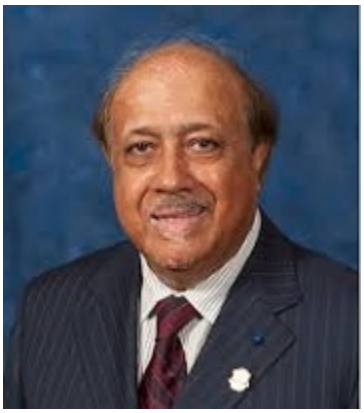
This year EMI adopted and implemented an entirely new approach for selecting Society and Institute award winners. Instead of a single Awards Committee, the new approach specified in the updated EMI bylaws creates a 5-member Award Selection Committee for each individual Society or Institute award administered solely by EMI, and a 5-member Award Recommendation Committee for each multi-entity Society award, where the EMI's recommendations represent a first stage of selection.

The EMI Awards Award Selection Committees and EMI Award Recommendation Committees consist of five members, including the three most recent Past Presidents of EMI and two other members to be selected by such process as established by the Board (usually, two non-conflicted previous winners of the award if available, or a previous EMI Board member if not). The EMI Award Selection Committees and EMI Award Recommendation Committees are chaired by the immediate Past President of EMI. The same principle applies to EMI's representation on the Awards Selection Committees of awards that are joint with other organizations.

The members of the EMI Award Selection Committees and EMI Award Recommendation Committees are chosen for the depth and breadth of their knowledge, their prudence and gravitas, and their ability to evaluate the relative merit of the nominations in an objective way. Furthermore, the recommendations of the committee are made only after extensive discussion within the committee, and voting is conducted by secret ballot. The EMI Board of Governors has also established rules regarding the review, selection, ratification and approval process, confidentiality, conflict-of-interests, and general guidelines.

2021 Award

2021 Nathan M. Newmark Medal *(Joint with the Structural Engineering Institute of ASCE)*



Ahsan Kareem, Ph.D., F.EMI, NAE, Dist.M.ASCE (University of Notre Dame) has been selected *"for his innovative contributions to advancements in a wide range of areas in structural engineering and engineering mechanics from theory and practice to leadership and education."*
The award was officially approved in August 2021 and will be presented at the award ceremony of the EMI 2022 conference at Johns Hopkins University.

LOCAL ACTIVITIES

EMI helped establish the Engineering Mechanics Committee within the ASCE Met Section in 2011. The Engineering Mechanics Committee of the ASCE Met Section organizes two major events at Columbia University: The Biot Lecture in the fall and the Mindlin Lecture in the spring. The videos of these prestigious lectures have been posted on the "EMI Lecture Series" page of the EMI website.

The EMI Objective Resilience Committee sponsored the Annual EMI Objective Resilience Lecture held at the University of Michigan in 2018, at Lehigh University in 2019, and virtually at the University of Mississippi in 2020. The videos of these lectures have been posted on the "EMI Lecture Series" page of the EMI website, together with those of the Mechanics Research Communications Elsevier Distinguished Lecture series.

COMMUNICATIONS

The monthly EMI newsletter continues to provide timely information to the membership regarding activities of the Institute, upcoming events and deadlines, and other useful information such as the table of contents of the current issues of the EMI journals. The newsletter also features a Research Group Profile that highlights the work of research team. Each RGP presents the problem the team is addressing, its approach, its findings, their impact, a list of selected publications, current research team members, industry partners, and research collaborations.

As a result of ASCE's major project to update its website using current technology and design principles, EMI now has an entirely new web site with a new contemporary design and an up-to-date content management system. It features a much-improved search capability that is further enhanced be the use of a unified, ASCE-specific taxonomy. The pages most frequently visited by EMI members can be found on the EMI home page. Some of the most frequently used include:

Conferences & Events;

Committees
Publications
Journal of Engineering Mechanics
ASCE Library
Awards
Fellows
EMI Lecture Series
Research Group Profiles
News
Membership.

A notable feature of the EMI website is the searchable database of a growing number of Research Group Profiles that present a snapshot of the research undertaken by EMI members. The collection of Research Group Profiles may be explored using the list of topics or the list of keywords shown or using the search bar. EMI committees also have their own webpages that can highlight their activities. The site also includes an on-line EMI membership application and an on-line technical committee membership application. In addition to these EMI-specific areas, the integration with the ASCE site provides immediate access to other areas of general interest.

COMMITTEES

The EMI community was deeply saddened by the October 29, 2020 passing of Bill Iwan, Ph.D., F.EMI, NAE, Dist.M.ASCE, Professor Emeritus at Caltech, and Founding President of EMI. He received the Nathan M. Newmark Medal in 1997 and was elected to the National Academy of Engineering in 1999. He became a Professor Emeritus in 2004 and received the William H. Wisely Award in 2006. He received the EERI George W. Housner medal in 2007 and became a Distinguished Member of ASCE in 2009. He received the Theodore von Kármán Medal and was elected Fellow of EMI in 2013. He will be missed by the entire engineering mechanics community.

The EMI committees continue their excellent work in supporting EMI activities, including reviewing papers submitted to the EMI journal; organizing sessions at the EMI annual conference; and organizing student paper or poster competitions at the annual conference. Although the EMI PMC 2020 conference had to be postponed, all the EMI committees met in May and June 2021 via Zoom. Many thanks to all our committee chairs and committee members for their continued support of EMI activities!

As they come to the end of their terms, several committee chairs are stepping down. EMI is grateful to the outgoing committee chairs for their dedication and hard work:

Dinesh Katti (*Biomechanics*) replaced by John Brigham
John Brigham (*Computational Mechanics*) replaced by Michael Hillman
Anthony Rosato (*Granular Materials*) replaced by Marcial Gonzalez
Wing Kam Liu (*Machine Learning for Mechanics*) replaced by Steve WaiChing Sun
Yong-Rak Kim (*Modeling Inelasticity and Multiscale Behavior*) replaced by Giuseppe Buscarnera
Nima Rahbar (*Nanomechanics and Micromechanics*) replaced by Ya Wei

Chloe Arson (*Poromechanics*) replaced by Pania Newell
Alex Taflanidis (*Probabilistic Methods*) replaced by Michael Shields
Anil Misra (*Properties of Materials*) replaced by Nima Rahbar
CW Lim (*Stability*) replaced by Stylianos Yiatros

Many thanks to the outgoing Committee Chairs, and welcome to the new Committee Chairs!

FINANCES

EMI is required to operate within the financial model of the ASCE Institutes. As such, its main sources of income are membership dues, publications and journal royalties, net income from conferences and continuing education activities, and donations. Its main areas of expenses are Board and committee operations; Institute operations; and staff salary, fringes, and travel. The postponement of the two EMI conferences planned in 2020 had a severe impact on EMI's finances. It was necessary to use a substantial percentage of EMI's reserves to keep the Institute in operation. Overall, EMI's financial situation is satisfactory but fragile, and additional resources are needed to increase EMI staff (currently 1.5 FTE) to adequately address the substantial increase in activity of the Institute.

ASSESSING PROGRESS

Since its founding in the fall of 2007, EMI has significantly expanded its program of activities, made significant progress in several areas, enhanced its program of prestigious awards, and significantly increased its membership while keeping with the tradition of organizing excellent conferences and producing high-quality publications. EMI enhanced its stature among the many U.S.-based mechanics-related associations and increased its international visibility and influence.

JEM's significantly increased its impact factor and decreased its time to publication. EMI continues to provide financial support to the student competitions. EMI regularly provides new content on its website and keeps its members informed through its newsletter. The EMI membership elects each year new members to its Board of Governors and can thus influence the governance of the Institute. EMI's considerable progress since its founding in the fall of 2007 is mostly due to the dedication and hard work of its volunteers and the effective support of its staff.

Beyond these accomplishments, EMI still needs to improve its financial sustainability, establish stronger connections to industry, and enhance its continuing education program.

We encourage EMI members to actively engage into the Institute activities, including:

- Renewing their membership.
- Giving a voluntary contribution (which may be tax deductible) to EMI when renewing their membership.
- Encouraging their graduate students, post docs and colleagues to join EMI and to remain members of EMI.
- Attending the EMI conferences and contributing to their technical program.
- Getting involved in EMI technical committee activities.
- Being responsive to requests for reviews of EMI journal articles.
- Suggesting or offering webinars and short courses.

- Encouraging organizations in industry and government that are users of advanced mechanics they are familiar with to become organizational members of EMI.
- Contributing articles to the Journal of Engineering Mechanics.
- Contributing volumes to the Lecture Notes in Mechanics series,
- Publishing collections of papers based on presentations at sessions and mini symposia at EMI conferences in the Trends in Engineering Mechanics Special Publication series.
- Submitting short articles, pictures, videos, and announcements to the EMI newsletter and the EMI website.

Thank you for all your support. Your continuous engagement and participation will allow EMI to grow and prosper. It has been my great honor to have the opportunity to serve as the President of EMI for the past year.

Sincerely,

Pol Spanos, Ph.D., P.E., F.EMI, NAE, Dist.M.ASCE
EMI President, FY 2021