



ANNUAL REPORT TO THE EMI MEMBERSHIP FOR FY 2018

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, 2017 to September 30, 2018 (FY 2018), 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 summer of 2017, EMI conducted an election for two open positions on the EMI Board of Governors, starting on October 1, 2017. Gianluca Cusatis, Ph.D., F.EMI, M.ASCE (Northwestern University) and Pol Spanos Ph.D., F.EMI, NAE, Dist.M.ASCE (Rice University) were elected by the EMI membership to serve a three-year term. George Deodatis, Ph.D., F.EMI, M.ASCE (Columbia University) and J.S. Chen, Ph.D., F.EMI, M.ASCE (University of California San Diego) served as FY 2018 EMI President and Past President, respectively. Glaucio Paulino, Ph.D., F.EMI, M.ASCE (Georgia Tech) and Ray Daddazio, Ph.D., F.EMI, M.ASCE (President, Thornton-Tomasetti) served the third year of their term in FY 2018. Somnath Ghosh, Ph.D., F.EMI, M.ASCE (The Johns Hopkins University), who served as FY 2018 Treasurer, and Antoinette Tordesillas, Ph.D., Aff.M.ASCE (University of Melbourne, Australia) served the second year of their term on the EMI Board of Governors. Many thanks to outgoing EMI Governors José Andrade, Ph.D., M.ASCE and Roberto Ballarini, Ph.D., P.E., F.EMI, F.ASCE for their dedicated service, and welcome to the new EMI Governors!

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

Administrative Division

- Awards Committee
- Bylaws Committee
- Communications Committee
- Education Committee
- Membership Committee
- New Initiatives Committee
- Nominations Committee

Publications Division

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

Conferences Division

Program Committee

Technical Division

Biomechanics Committee

Computational Mechanics Committee

Dynamics Committee

Elasticity Committee

Experimental Analysis & Instrumentation Committee

Fluid Dynamics Committee

Granular Materials Committee

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



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



Gianluca Cusatis, Ph.D.,
F.EMI, M.ASCE



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



Ray Daddazio, Ph.D.,
F.EMI, M.ASCE



Somnath Ghosh, Ph.D.,
F.EMI, M.ASCE
Treasurer



Glaucio Paulino, Ph.D.,
F.EMI, M.ASCE

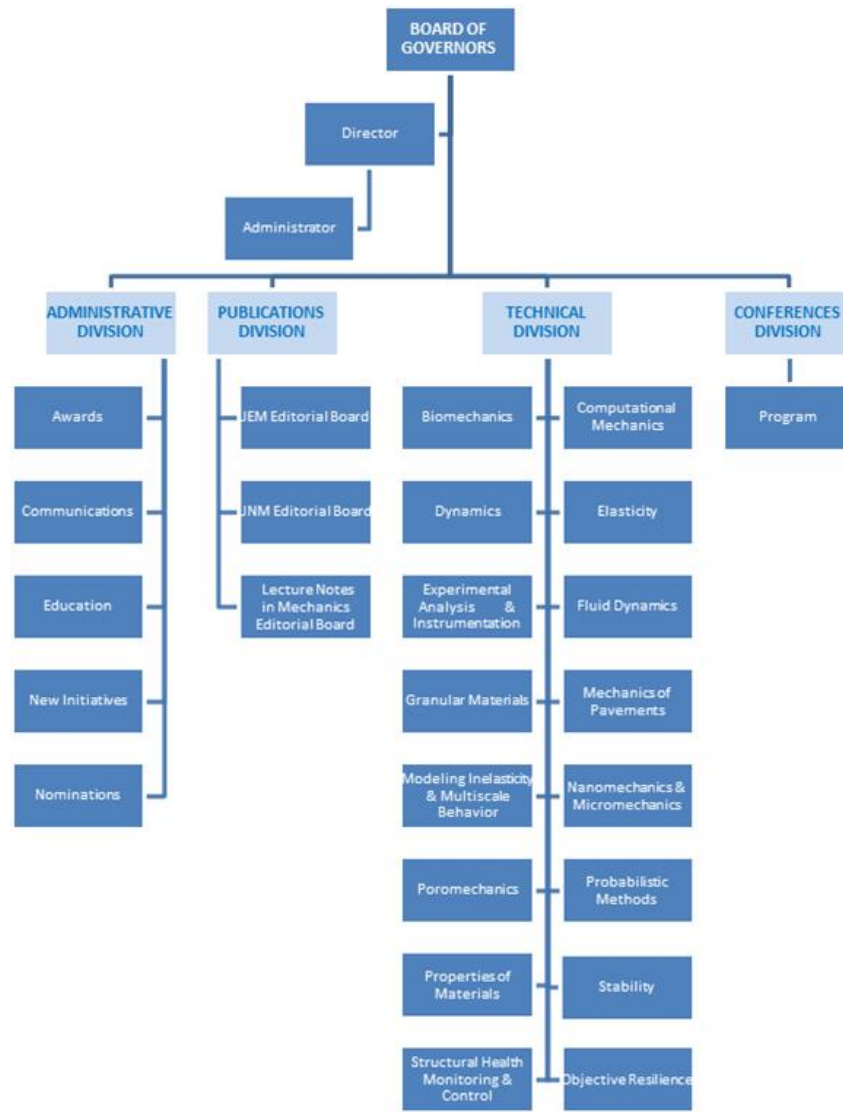


Pol Spanos, Ph.D., F.EMI,
NAE, Dist.M.ASCE
Vice President



Antoinette Tordesillas,
Ph.D., Aff. M.ASCE

FY 2018 EMI Board of Governors



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 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](#) and for [EMI-only membership](#). On-line membership renewal is now available for both types of 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 over 2,500. About 34% of the EMI members reside outside the U.S. (64 countries). Over 90% of the EMI members are in academia or research, and about 24% are students. EMI counts 16 Distinguished/Honorary Members of ASCE and 21 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, F.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 with an all-time high of 1.799 for 2017, and a decrease in the time to first decision time (3.5 months excluding rejects and 2.4 months including rejects). With these substantial improvements in the journal performance measures, JEM has become one of the most prestigious mechanics journals.

JEM celebrated its 60th anniversary with the publication of a special online collection of invited papers that reflect the depth and breadth of the research that is regularly published in JEM and that is championed by EMI. These papers could be downloaded for free during 2017. A Special Collection of 13 papers on the Mechanics of Unsaturated Porous Media was published by Guest Editors Ning Lu and Giuseppe Buscarnera.

Following the decision of the EMI Board of Governors, the [Journal of Nanomechanics and Micromechanics](#) (JNM) ceased publication with the December 2017 issue. JNM aimed at bridging physics, physical chemistry and mechanics of materials at nano- and micro-scales. All content previously published is now freely available to the public.



CONFERENCES

EMI 2018 Conference

EMI held its 2018 conference on the campus of the Massachusetts Institute of Technology in Cambridge, MA from May 29 to June 1. The [EMI 2018 conference](#) was chaired by Arghavan Louhghalam (U. Mass Dartmouth), Roland Pellenq (M.I.T. and CNRS), Mazdak Tootkaboni (U. Mass Dartmouth), and Franz-Josef Ulm (M.I.T.). Ms. Donna Hudson chaired the Local Organizing Committee. The total number of registrations (1,004) broke all previous records, and the conference program included nearly 950 presentations in 21 parallel sessions. There were participants from over 40 countries.

The conference featured [six plenary lectures](#) given in the Kresge Auditorium by leading researchers:

Prof. Emanuela Del Gado (Georgetown University): Sustainable concrete and cement: A soft matter in construction

Prof. Christian Hellmich (Vienna University of Technology): Towards unified hierarchical modeling of hard and soft biological tissues

Prof. Roger Ghanem (University of Southern California): Physics, Structure, and Uncertainty: Probabilistic Learning for Risk Mitigation

Prof. Pedro Reis (École Polytechnique Fédérale de Lausanne, Switzerland): Shell-buckling revisited: “Everybody loves a buckling problem!”

Prof. Nadia Lapusta (Caltech): Under the hood of the earthquake machine

Prof. Lydia Bourouiba (M.I.T.): Unsteady fluid fragmentation

The conference program also included a special NSF-sponsored Panel Session on “Fostering Engineering Mechanics Research Community Diversity and Inclusion”, with the participation of Dr. Makola Abdullah (Virginia State University), Prof. Jennifer Bridge (University of Florida), Prof. Shirly Dyke (Purdue University) and Prof. Carol Shield (University of Minnesota). Younger researchers had an opportunity to learn about preparing successful proposals in a special session with three NSF program Directors: Dr. Grace Hsuan, Dr. Joy Pauschke, and Dr. Siddiq Qidwai.



Emanuela Del Gado



Christian Hellmich



Roger Ghanem



Pedro Reis



Nadia Lapusta



Lydia Bourouiba

Plenary Lecture Speakers

The EMI Board of Governors met on the occasion of the conference, as did all the EMI Technical Committees and the Editorial Board of the Journal of Engineering Mechanics. Six committees organized [student paper competitions](#):

EMI Fluid Dynamics Committee Student Paper Competition

EMI Probabilistic Methods Committee Student Paper Competition

EMI Dynamics Committee Student Paper Competition

EMI Modeling Inelasticity & Multiscale Behavior Committee Student Competition
EMI Objective Resilience Committee Student Competition
EMI Structural Health Monitoring and Control Committee Student Paper Competition

The EMI Computational Mechanics Committee organized a [Student Poster Competition](#) where students had to submit a poster, a three-page paper supplemental to the poster, and one summary slide for the “blitz” presentation of their research. The competition was held in two stages: 1) a “blitz” slide presentation of the research where each participant had 2 minutes to introduce their research to the audience; and 2) discussion and Q &A by the posters with a panel of three judges.

The social events included: An Ice Breaker reception on May 29 by the Kresge Auditorium and the huge tent used for the receptions, breakfast, morning and afternoon breaks and lunch; a Welcome reception on May 30 in the same location; and a reception and awards banquet at the Hyatt Regency Cambridge.

Certificates and medals were presented at the awards banquet to the [winners of ASCE and EMI awards](#):

[ASCE Walter L. Huber Civil Engineering Research Prizes](#)



PROF. JOSE E. ANDRADE, PH.D., M.ASCE

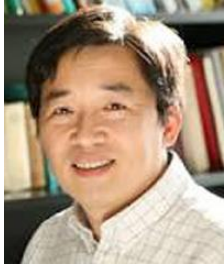
Prof. José E. Andrade, Ph.D., M.ASCE (Caltech) is honored for *"revolutionizing the field of granular geomaterials by replacing heuristic methodologies with rigorous multiscale modeling approaches based on scientific understanding of the mechanics and physics across scales and for defining new frontiers for the civil engineering profession including planetary exploration."*



PROF. YURI BAZILEVS, PH.D., A.M.ASCE

Prof. Yuri Bazilevs, Ph.D., A.M.ASCE (University of California San Diego) is honored for *"pioneering work in the development of isogeometric analysis and its applications to problems in mechanics of fluids, solids, and structures and for the development of core and special-purpose FSI methods and their pioneering applications in wind energy and extreme-events modeling."*

Zdeněk P. Bažant Medal for Failure and Damage Prevention



PROF. YONGGANG HUANG, PH.D., M.ASCE, NAE

Prof. Yonggang Huang, Ph.D., M.ASCE, NAE (Northwestern University) has been selected for *"pioneering work on macro-, micro-, and nano-scale fracture, and application to transfer printing."*

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



PROFESSOR EMERITUS HANS-JÜRGEN NIEMANN, DR. ING. HABIL

Professor Emeritus Hans-Jürgen Niemann, Dr. Ing. Habil (Ruhr-Universität Bochum, Germany) has been selected for *"introducing the field of wind engineering to practice and his research on the interaction of wind and structures that led to the design of safe and reliable engineering structures."*

Alfred M. Freudenthal Medal



PROF. ZDENĚK P. BAŽANT, PH.D., S.E., NAE, NAS, F.EMI, HON.M.ASCE, NAE

Prof. Zdeněk P. Bažant, Ph.D., S.E., NAE, NAS, F.EMI, Hon.M.ASCE, NAE (Northwestern University) has been selected for *"developing a comprehensive theory of probabilistic, mechanics of strength, lifetime, and size effect of quasi-brittle structures."*

George W. Housner Structural Control and Monitoring Medal



PROF. ORAL BUYUKOZTURK, PH.D., M.ASCE

Prof. Oral Buyukozturk, Ph.D., M.ASCE (M.I.T.) has been selected for *"pioneering and transformative developments in video-based structural sensing and identification, interferometry-based data analytics, high-efficiency generic wireless networks, and their integration with groundbreaking engineering mechanics research and practice for enhancing civil infrastructural resilience and sustainability."*

Raymond D. Mindlin Medal



PROF. JAMES R. RICE, PH.D., M.ASCE, NAE

Prof. James R. Rice, Ph.D., M.ASCE, NAE (Harvard University) has been selected for *"pioneering work in continuum mechanics with applications to various engineering materials and natural processes."*

Theodore von Kármán Medal



PROF. J. N. REDDY, PH.D.

Prof. J. N. Reddy, Ph.D. (Texas A & M University) has been selected for *"fundamental contributions to shear deformation theories of plates and shells and their applications as well as the authorship of well-received textbooks that have lasting impact on engineering mechanics education."*

[Nathan M. Newmark Medal](#) (Joint with the Structural Engineering Institute of ASCE)



PROF. BILLIE F. SPENCER, PH.D., P.E., F.ASCE

Prof. Billie F. Spencer, Ph.D., P.E., F.ASCE (University of Illinois at Urbana-Champaign) has been selected for "*pioneering work, innovations, and leadership in the theory and application of advanced technologies to fundamental problems in structural engineering and mechanics, as well as for his unwavering commitment to education/mentoring of students and professional service.*"

[EMI Leonardo da Vinci Award](#)



PROF. WAICHING SUN, PH.D., A.M.ASCE

Prof. WaiChing Sun, Ph.D., A.M.ASCE (Columbia University) has been selected "*for his fundamental contributions to computational multiscale poromechanics.*"

The winners of the seven student competitions also received certificates:

The winners of the seven student competitions also received certificates:

EMI FLUID DYNAMICS COMMITTEE STUDENT PAPER COMPETITION

- Huilin Ye, University of Connecticut (winner)

EMI PROBABILISTIC METHODS COMMITTEE STUDENT PAPER COMPETITION

- Sang-ri Yi, Seoul National University (winner)
- Jize Zhang, University of Notre Dame (winner)

EMI DYNAMICS COMMITTEE STUDENT PAPER COMPETITION

- Mostafa Mirshekari, Carnegie Mellon University (winner)
- Ioannis Petromichelakis, Columbia University (winner)

EMI MODELING INELASTICITY & MULTISCALE BEHAVIOR COMMITTEE STUDENT COMPETITION

- Liang Bowen, Ohio State University (1st place)
- Binyam Bekele, University of Nebraska-Lincoln (2nd place)
- Rilin Shen, Columbia University (3rd place)
- Qiliang Lin, Columbia University (3rd place)

EMI OBJECTIVE RESILIENCE COMMITTEE STUDENT COMPETITION

- Panos Pantidis, University of Massachusetts, Amherst (1st place)
- Liyang Ma, Lehigh University (2nd place)
- May Haggag, McMaster University (3rd place)

EMI STRUCTURAL HEALTH MONITORING AND CONTROL COMMITTEE STUDENT PAPER COMPETITION

- Konstantinos Tatsis, ETH Zurich (1st place)
- Jack Reilly, Princeton University (2nd place)
- Arvin Ebrahimkhanlou, The University of Texas at Austin (3rd place)

EMI COMPUTATIONAL MECHANICS TECHNICAL COMMITTEE STUDENT POSTER COMPETITION

- Mohammad Joshaghani, University of Houston (winner)
- Phillipe Alves, University of Illinois at Urbana-Champaign (runner-up)
- Ruize Hu, Vanderbilt University (runner-up)

The awards banquet was also the venue for recognizing the three newly elected EMI Fellows:

Prof. Joel Conte, Ph.D., P.E., F.EMI, M.ASCE (University of California San Diego)

Prof. Gianluca Cusatis, Ph.D., F.EMI, M.ASCE (Northwestern University)

Prof. Anil Misra, Ph.D., P.E., F.EMI, F.ASCE (University of Kansas)

Prof. Xiaodan Ren (Tongji University), Prof. José Andrade (Caltech) and Prof. Ali Daouadji (INSA of Lyon) gave a preview of the upcoming EMI conferences at their respective institutions.

The [entire program](#) of the conference, including the schedule of meetings, sessions, plenary lectures, student competitions and social events was posted on the conference website. The [Conference4me](#) smartphone app had the same information as well as the full abstract of each presentation and plenary lecture.

This very successful event is documented in an extensive [photo gallery](#). Congratulations and many thanks to Prof. Arghavan Louhghalam (U. Mass Dartmouth), Roland Pellenq (M.I.T. and CNRS), Mazdak Tootkaboni (U. Mass Dartmouth), and Franz-Josef Ulm (M.I.T.) and their team for organizing and hosting a memorable conference!



Reception and Awards Banquet



Yuri Bazilevs and José Andrade (Huber prize)



Yonggang Huang (Zdeněk Bažant Medal)



Hans-Jürgen Niemann (Scanlan Medal)



Zdeněk Bažant (Freudenthal Medal)



Oral Buyukozturk (Housner Medal)



James Rice (Mindlin Medal)



Billie Spencer (Newmark Medal)



WaiChing Sun (EMI Leonardo da Vinci Award)



Gianluca Cusatis (EMI Fellow)



Glaucio Paulino (EMI Fellow)



Arghavan Louhghalam, Mazdak Tootkaboni, Roland Pellenq, Donna Hudson, and Franz Ulm



Amar Chaker, Verna Jameson, and George Deodatis

Upcoming Conferences

The [EMI 2019 conference](#) will be held on June 19-21, 2019 at Caltech. It is planned that the 2020 EMI annual conference and the 2020 Probabilistic Mechanics Conference will be held at Columbia University.

The 2018 EMI International Conference will be held on November 2-4, 2018 at Tongji University in Shanghai, China. The 2019 EMI International Conference will be held on July 3-5, 2019 at INSA of Lyon, France. The 2020 EMI International Conference will be held at Durham University in Durham, U.K. The University of Salerno, Italy, the University of Ghent, Belgium and Hanyang University in Seoul, Korea have expressed an interest in hosting future EMI International Conferences.

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 and other prestigious lectures have been posted on the “[EMI Lecture Series](#)” page of the EMI website.

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.

The [EMI website](#) includes:

- The searchable database of a growing number of [Research Group Profiles](#) that present a snapshot of the research undertaken by EMI members.
- EMI-specific areas on [books](#) and [journals](#), [conferences and events](#), [continuing education and jobs](#), [membership](#), and [awards](#).
- A [news](#) section.
- A searchable section on [EMI committees](#) providing automatically updated committee membership rosters and committee charges
- An [EMI Lectures Series](#) page which featuring the videos of the most recent Biot and Mindlin Lectures and Mechanics Research Communications Elsevier Distinguished Lectures.

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. Content valued by the members that was temporarily removed during the website redesign such as the RSS feed from iMechanica was restored.

COMMITTEES

The EMI committees continue their excellent work in supporting EMI activities, including reviewing papers submitted to the EMI journals; organizing sessions at the EMI annual conference, and organizing student paper or poster competitions at the annual conference. All the EMI committees met at the EMI 2018 conference. 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:

Panayiotis Diplas (Fluid Dynamics), replaced by James Michael Kaihatu
Yong-Rak Kim (Mechanics of Pavements), replaced by Hao Wang

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. A positive net financial result is expected for FY 2018, which be added to EMI's reserves which serve both as a "rainy day" fund and a source of funding for new promising initiatives. Overall, EMI's financial situation is satisfactory, but additional resources are needed to increase EMI staff (currently 1.5 FTE) to adequately address the substantial increase in activity.

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 content-rich publications. EMI enhanced its stature among the many U.S.-based mechanics-related associations and increased its international visibility and influence.

EMI held a very successful EMI 2018 conference at M.I.T. *JEM*'s significantly increased its impact factor and decreased its time to publication. EMI continued 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.

Despite 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 (tax deductible) voluntary contribution to EMI when renewing their membership
- Encouraging their graduate students 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 EMI journal
- 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, and I look forward to continuing to serve as EMI President in FY 2019.

Respectfully submitted,

A handwritten signature in black ink that reads "Deodatis Georgios". The signature is written in a cursive, flowing style.

George Deodatis, Ph.D., F.EMI, M.ASCE
EMI President, FY 2018