



ANNUAL REPORT TO THE EMI MEMBERSHIP FOR FY 2016

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, 2015 to September 30, 2016 (FY 2016), 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 2015, EMI conducted an election for one open position on the EMI Board of Governors, starting on October 1, 2016. Glaucio Paulino, Ph.D., A.M.ASCE (Georgia Tech) was elected by the EMI membership to replace Roger Ghanem, Ph.D., F.EMI, M.ASCE (University of Southern California). The new EMI Board elected J.S. Chen (University of California San Diego), EMI president for FY 2016, to serve a second year as EMI President in FY 2017, Muhammad Hagg, Ph.D., F.EMI, M.ASCE (Virginia Tech) to serve as EMI Vice-President in FY 2016, and Ning Lu, Ph.D., F.EMI, F.ASCE (Colorado School of Mines) to serve as EMI Treasurer in FY 2016. Ray Daddazio, Ph.D., F.EMI, M.ASCE (President, Thornton-Tomasetti) replaced Dan Frangopol, Ph.D., F.SEI, F.EMI, Dist.M.ASCE (Lehigh University) as the ASCE-appointed Governor. Roberto Ballarini, Ph.D., F.EMI, F.ASCE (University of Houston) served as Past President in FY 2016.

Many thanks to the outgoing members of the EMI Board for their years of dedicated service to the Institute, 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

EMI BOARD OF GOVERNORS

FY 2016



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



José Andrade, Ph.D.,
M.ASCE



George Deodatis, Ph.D.,
M.ASCE



Roberto Ballarini, Ph.D.,
P.E., F.EMI, F.ASCE
Past President



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



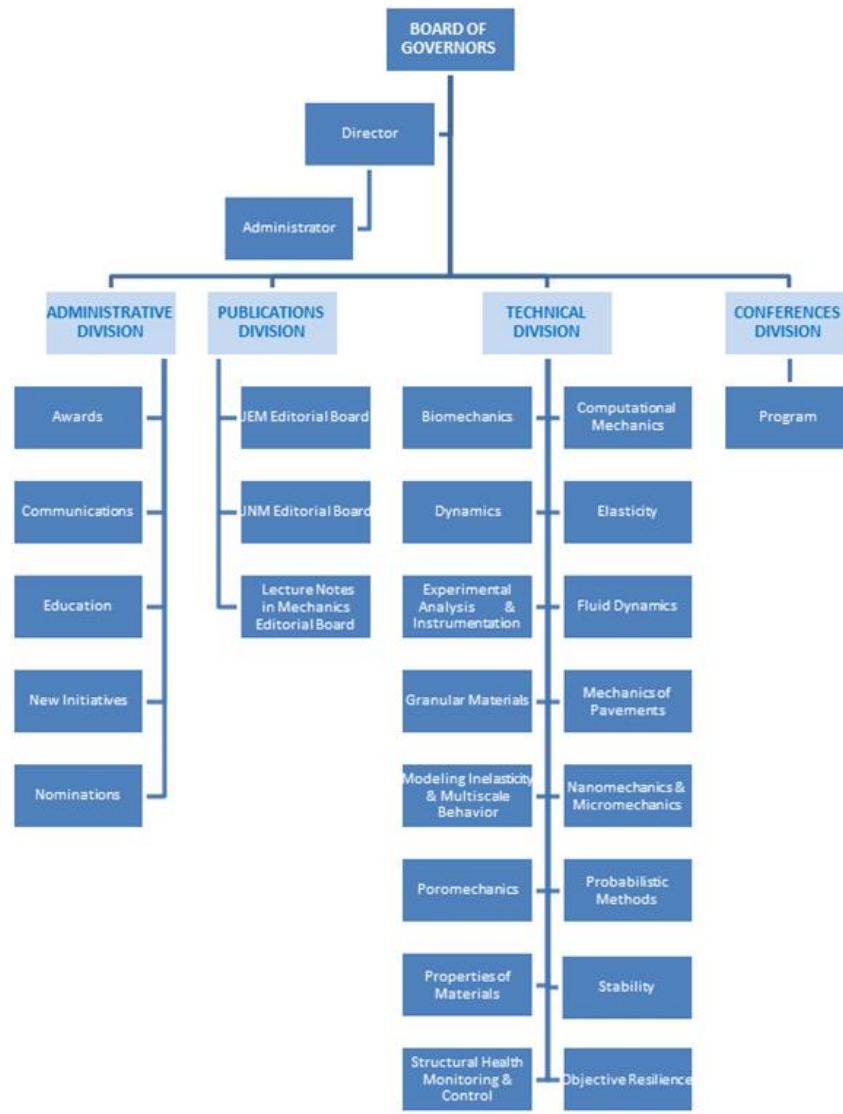
Glaucio Paulino, Ph.D.,
A.M.ASCE



Muhammad Hajj, Ph.D.,
F.EMI, M.ASCE, Vice



Ning Lu, Ph.D., F.EMI
F.ASCE, Treasurer



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 discount 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 have been kept at same level since the start of EMI in FY 2008:

- \$80 per calendar year for EMI-only members;
- \$25 for EMI-only (full-time graduate) student members;
- For ASCE members, free in choosing EMI as the 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 reduced membership fees for graduate students, student competitions, and the recently established EMI Leonardo da Vinci award. EMI membership has grown to about 2,600. Over 30% of the EMI members reside outside the U.S. (70 countries). About 25% of the EMI members are students, and over 90% of them are in academia or research. EMI counts 19 Distinguished/Honorary Members of ASCE 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 four years. There has been a 62% increase in submissions (from 375 to 608), a 33% increase in papers published annually (from 135 to 180), a 50% reduction in acceptance rate (from 51% to 25%), a strong increase in impact factor with an all-time high of 1.346 for 2015, and a dramatic decrease in review to first decision time (from 6.7 months down to 3.3 months). JEM has become one of the most prestigious mechanics journals.

Roland Pellenq, Ph.D., A.M.ASCE (M.I.T.) and Christian Hellmich, Ph.D., F.EMI, M.ASCE (Vienna University of Technology) are serving as Co-Editors of the quarterly [Journal of Nanomechanics and Micromechanics](#) (JNM). JNM aims at bridging physics, physical-chemistry and mechanics of materials at nano- and micro-scales.



Conferences

EMI held its annual conference (EMI 2016) and the quadrennial Probabilistic Mechanics and Reliability Conference (PMC 2016) at Vanderbilt University on May 22-25, 2016, and has been planning its second international conference to be held on October 25-27, 2016 at the University of Lorraine in Metz, France.

EMI 2016 and PMC 2016 Conference

Prof. Sankaran Mahadevan and Prof. Çağlar Oskay (Civil and Environmental Engineering Dept., Vanderbilt University) chaired the EMI 2016/ PMC 2016 Conference held on May 22-25, 2016 at Vanderbilt University in Nashville, Tennessee. The conference attracted about 700 attendees to the event. The [conference technical program](#) included **697 presentations from 25 countries** presented in 14 parallel sessions over three full-days. The conference also featured six keynote lectures on the following topics:

- Spatial and Temporal Multiscale Models for Advancing the Integrated Computational Materials Engineering (ICME) Initiative, Somnath Gosh, The Johns Hopkins University
- Surrogate Models for Uncertainty Quantification and Reliability Analysis, Bruno Sudret, ETH Zurich
- On the Complexity of Elastic Waves Trapped in Convex Features, Domniki Asimaki, Caltech
- The Changing Dynamic of Wind Effects on Structures: A Transition to a Non-Stationary, Non-Linear and Non-Gaussian Outlook, Ahsan Kareem, The University of Notre Dame
- Similarities and Differences Between MD and DEM Simulations, an Historical Perspective, Otis Walton, Lawrence Livermore National Laboratory & Grainflow Dynamics Inc., Livermore, CA
- Structural Health Monitoring: Past, Present and Future, Achintya Haldar, University of Arizona

Two short courses were offered in the Conference:

- “Theory and Practice of the Generalized/eXtended Finite Element Method” by Prof. Armando Duarte, University of Illinois at Urbana-Champaign and Prof. Angelo Simone, Delft University, Netherlands.
- “Bayesian Model Updating and Uncertainty Quantification: Theory, Computational Tools, and Applications” by Prof. Babak Moaveni, Tufts University and Prof. Costas Papadimitriou, University of Thessaly, Greece.

Two panel discussion sessions on “Applications of Probabilistic Methods – Emerging Opportunities and Challenges” and on “The Role of Uncertainty in Modeling Resilience” were held as part of the Probabilistic Mechanics and Reliability Conference program.

[Six student competitions](#) were organized by the EMI Technical Committees of Probabilistic Methods, Computational Mechanics, Granular Materials, Modeling Inelasticity and Multi-Scale Behavior, Structural Health Monitoring and Control, and Dynamics. The EMI Board of Governors, EMI Technical Committees, and the Editorial Board of the *Journal Nanomechanics and Micromechanics* met at the conference. ASCE Publications prepared a “**content slice**” that includes a collection of the 10 most downloaded articles from EMI journals that will be available to download for free one month before the conference and one month after the conference. This will help promote both the conference and EMI publications. Social events at the conference included an ice breaker reception, a welcome reception with twice Grammy winner Jim Lauderdale, and a banquet and award presentation ceremony.

The attendees’ experience at the conference was enhanced by the use of [Twitter](#) and of the [Conference4me](#) smartphone app which provided the full conference program, maps, and the abstracts of the presentations, and allowed the participants to create their personal itinerary. A total of 128 attendees took advantage of the special offer to become new EMI members. Many thanks to Prof. Sankaran

Mahadevan and Prof. Çağlar Oskay of Vanderbilt University and their team for organizing and hosting a truly outstanding conference!



L to R: Charity Hasty, Karen Page, J.S. Chen, Sankaran Madadevan and Çağlar Oskay

The award ceremony also featured the recognition of a new EMI Fellow, Arif Masud, Ph.D., F.EMI, M.ASCE (University of Illinois at Urbana-Champaign).



L to R: Arif Masud, Glaucio Paulino and J.S. Chen

Plenary session speakers



Somnath Ghosh



Domnicki Assimaki



Ahsan Kareem



Otis Walton



Achyntia Haldar



Bruno Sudret



Babak Moaveni



Amando Duarte



Ice Breaker Reception



Welcome Reception



Banquet and Awards Ceremony



Banquet and Awards Ceremony

Upcoming Conferences

For FY 2017, EMI is also working on three upcoming EMI conferences. EMI will hold its second international conference at the University of Lorraine in Metz, France on October 25-27, 2016 (<http://www.lem3.fr/2016EMI-IC/>). Chaired by Prof. Mahdia Hattab of the Laboratoire de Microstructures, Mécanique et Matériaux (LEM3), a long-time member of ASCE's Engineering Mechanics Institute, the conference aims at getting audiences from countries in and near Europe acquainted with

EMI. [Six outstanding plenary session lecturers](#) have been confirmed, and the [conference program](#) is expected to feature about 350 presentations. The social events will take place in outstanding locations (Eglise St-Pierre aux Nonnains, the oldest church in Europe built in 400 AD for the welcome reception, and the historic Abbaye des Prémontrés for the banquet).

The [2017 EMI International Conference](#) will be held on March 19-22, 2017 in Rio De Janeiro, Brazil and will be chaired by Prof. Ney Dumont (Pontifical Catholic University of Rio de Janeiro). [Nineteen mini-symposia](#) have been accepted and one [short course](#) is confirmed.

The [EMI 2017](#) will take place in San Diego, California on June 4-7, 2017 and will be chaired by Prof. J.S. Chen and Prof. Yuri Bazilevs from University of California, San Diego. A total of [78 mini-symposia](#) proposals have been accepted, and the Conference also features 6 Plenary Lectures. Abstract submission opened on October 1. A two-day preconference short course on fluid-structure interaction will be offered. An all-day symposium is scheduled on Monday, June 5 to celebrate the 80th birthday of Zdeněk P. Bažant, Ph.D., S.E., NAS, NAE, Hon.M.ASCE. [Five student competitions](#) have already been announced.

EMI will also take part in the organization of the **6th Biot Conference on Poromechanics** (<http://biot2017.sciencesconf.org/>) to be chaired by Prof. Matthieu Vandamme and held at Ecole des Ponts Paris Tech in Paris, France on July 9-13, 2017. Nearly 300 abstracts were submitted by the September 30 deadline, and conference proceedings will be published.

It is planned that the 2018, 2019 and 2020 EMI annual conferences will be held at M.I.T., Caltech, and Columbia University, respectively. Future EMI international conferences are also under consideration for 2018 (Tongji University in Shanghai, China) and beyond.

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 organized two major events at Columbia University: the 2015 [Biot Lecture](#), presented on December 11, 2015 by Prof. Robert W. Zimmerman, Imperial College, London, titled “The Effects of Pore Structure, Pore Fluid, Stress, and Frequency on Elastic Wavespeeds in Sandstones”, and the 2016 [Mindlin Lecture](#) presented on March 18, 2016 by Prof. J. Tinsley Oden, University of Texas – Austin, titled “Foundations of Predictive Computational Science: Selection and Validation of Models of Complex Systems in the Presence of Uncertainty.” The videos of these and other prestigious lectures will be posted on the “[EMI Lecture Series](#)” page of the EMI website.

Continuing Education

In addition to the two full-day short courses offered at the EMI / PMC 2016 conference, a webinar on “Modeling, Design, 3-D Printing of Multiscale Materials and Structures” was given by Prof. Markus Buehler (M.I.T.) on December 2, 2015. That webinar will be offered again on October 26, 2016.

Awards

EMI expanded its extensive [awards program](#) with the creation of the [Zdeněk P. Bažant Medal for Failure and Damage Prevention](#) established in January 2015 by the ASCE Board of Direction. The establishment of this award is to recognize an individual for significant contributions to the engineering science of failure and damage prevention. The award selection committee, which is composed of members of the Engineering Mechanics Institute and the U.S. National Committee on Theoretical and Applied Mechanics of the National Academies (USNCTAM), recommended Subra Suresh, Sc.D., President of Carnegie Mellon University, and a member of the three U.S. National Academies for the inaugural Zdeněk Bažant award.

Dr. Suresh and the winners of other prestigious Society and Institute awards were recognized on May 24 at the banquet and award presentation ceremony of the EMI 2016/ PMC 2016 Conference. The awards were presented by J.S. Chen, F.EMI, M.ASCE, EMI President:

2016 ZDENĚK P. BAŽANT MEDAL FOR FAILURE AND DAMAGE PREVENTION

Subra Suresh, Sc.D., NAE, Carnegie Mellon University, was awarded the 2016 Zdenek P. Bazant Medal for Failure and Damage Prevention Medal *"for his pioneering work on failure and damage prevention of metallic and composite materials under cyclic and other loadings."*

2016 MAURICE A. BIOT MEDAL

Ronaldo I. Borja, Ph.D., A.M.ASCE, Stanford University, was awarded the 2016 Maurice A. Biot Medal *"for his significant contributions to the development of theoretical and computational framework for saturated and unsaturated porous media, and for bringing 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) was awarded the 2016 Jack E. Cermak medal *"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 was awarded 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."* Ahsan Kareem received the medal on behalf of Dr. Ellingwood.

2016 NATHAN M. NEWMARK MEDAL

Mircea D. Grigoriu, Ph.D., F.EMI, F.ASCE, Cornell University was awarded the 2016 Nathan M. Newmark medal 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 was awarded the 2016 Robert H. Scanlan medal for *"fundamental contributions to mathematical modeling, quantification, and analysis of wind effects on buildings and structures."* It will be presented to Dr. Tamura at the EMI 2017 conference.

2016 THEODORE VON KÁRMÁN MEDAL

Ares J. Rosakis, Ph.D., A.M.ASCE, California Institute of Technology (Caltech), was awarded the 2016 Theodore von Karman medal for *"discovering several fundamental physical phenomena in dynamic fracture of heterogeneous materials and interfaces at various length and time scales."* It will be presented to Dr. Rosakis at the EMI 2017 conference.

2016 EMI LEONARDO DA VINCI AWARD

Matthieu Vandamme, Ph.D., A.M.ASCE, Laboratoire Navier, Ecole des Ponts et Chaussées, was awarded the 2016 EMI Leonardo da Vinci Award *"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."*



Subra Suresh, Sc.D., NAE, Prof. Glaucio Paulino, and J.S. Chen, EMI President (from left)



Ronaldo I. Borja, Ph.D., A.M.ASCE and J.S. Chen, EMI President (from left)



Qiusheng Li, Ph.D. and J.S. Chen, EMI President (from left)



Prof. Ahsan Kareem (for Bruce R. Ellingwood, Ph.D., P.E., F.SEI, Dist.M.ASCE, NAE), Prof. Glaucio Paulino, and J.S. Chen, EMI President (from left)



Mircea D. Grigoriu, Ph.D., F.EMI, F.ASCE, Prof. Glaucio Paulino, and J.S. Chen, EMI President (from left)



Matthieu Vandamme, Ph.D., A.M.ASCE, Prof. Glaucio Paulino, and J.S. Chen, EMI President (from left)

The finalists and winners of the six student competitions were also presented with certificates.



Computational Mechanics Student Poster Competition Winner: Andreas Krischok, Stanford University, with Prof. Çağlar Oskay (from left) Runner Ups: Juan Londono, Columbia University, and Miguel Arriaga, Columbia University



Dynamics Student Paper Competition Winner: Reza Yaghmaie Johns Hopkins University, with Prof. Ivan Au (from left)



Granular Materials Student Poster Competition 1st place: Andrew Druckrey, University of Tennessee with Prof. Anthony Rosato (from left) 2nd place: Mr. Yu-Feng Su, Florida International University (FIU)



Modeling Inelasticity & Multiscale Behavior Student Paper Competition Winner: **Xiang Zhang**, Vanderbilt University, with Prof. Cusatis (from right) Runner Ups: Amrita Kataruka, University of Illinois at Urbana-Champaign, and SeonHong Na, Columbia University



Probabilistic Methods Student Paper Competition
Winners: Chenzhao Li, Vanderbilt University, Christos Vlachos, Columbia University, Prof. Alex Taflanidis, and Wei Cui, Northeastern University (from left)



Structural Health Monitoring & Control Student Paper Competition
Prof. Babak Moaveni, Winner: Yizheng Liao, Stanford University, and J.S. Chen, EMI President (from left)
2nd place: Giovanni Capellari, Politecnico di Milano
3rd place: Carl Malings, Carnegie Mellon University

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 newly redesigned [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 three most recent Biot and Mindlin Lectures and Mechanics Research Communications Elsevier Distinguished Lectures. Additional lectures in these three series as well as keynote lectures from EMI conferences will be added in the coming months.

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 and was restored.

Committees

The EMI committees continue their excellent work in supporting EMI activities, including reviewing papers submitted to the two EMI journals; organizing sessions at the EMI annual conference, organizing student

paper or poster competitions at the annual conference, among others. All the EMI committees met at the EMI 2016/PMC 2016 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:

Ertugrul Taciroglu (Computational Mechanics)
Suren Chen (Experimental Analysis & Instrumentation), replaced by Asad Esmaily
Q. Jim Chen (Fluid Dynamics), replaced by Panayiotis Diplas
Lizhi Sun (Nanomechanics and Micromechanics)
Zhanping You (Mechanics of Pavements), replaced by Yong-Rak Kim
Juan Caicedo (Structural Health Monitoring and Control), replaced by Babak Moaveni

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, and net income from conferences and continuing education activities. Its main areas of expenses are: Board and committee operations; Institute operations; and staff salary, fringes and travel. The net result for FY 2016 is expected to be a net income of about \$11K, with an additional \$6,400 of membership deferred income to be credited in calendar year 2016. The net result for FY 2016 will 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 very satisfactory.

Assessing Progress

Looking back at FY 2016, EMI has significantly expanded its program of activities, made significant progress in several areas, and increased its membership. EMI held a successful EMI PMC 2016 conference and has kept with the tradition of organizing excellent annual conferences and producing content-rich publications. EMI has significantly improved *JEM*'s impact factor and shortened its time to publication, and has made progress to increase submissions to *JNM*. EMI expanded its award program by adding a Society award and has continued to provide financial support to the student competitions. EMI has provided new content on its website and effectively connected to its members informed through its newsletter. The EMI membership participates in electing members of its Board of Governors on a regular basis and is provided channels to provide inputs in the governance of the Institute. EMI has made considerable progress since its founding in the fall of 2007. This is mostly due to the dedication and hard work of its volunteers and the effective support of its staff.

Despite the accomplishments, EMI will continue to improve its financial sustainability, establish better connections to industry and enhance its continuing education program.

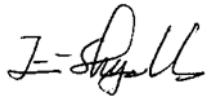
We encourage EMI members to actively engage into the Institute activities, including:

- 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 conference(s) and contributing to their technical programs
- Getting involved in EMI technical committee work

- Being responsive to requests for reviews of EMI journal articles
- Suggesting or offering webinars and short courses
- Encouraging to become organizational members of EMI the organizations they know in industry and government that are users of advanced mechanics
- Contributing articles to the EMI journals
- 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.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'J.-S. Chen'.

J.-S. Chen, Ph.D., F.EMI, M.ASCE
EMI President, FY 2016