



## ANNUAL REPORT TO THE EMI MEMBERSHIP FOR FY 2014

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, 2013 to September 30, 2014 (FY 2014), 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 2013, EMI conducted an election for two open positions on the EMI Board of Governors for FY 2014. Muhammad Hajj, Ph.D., M.ASCE (Virginia Tech) and Ning Lu, Ph.D., F.ASCE (Colorado School of Mines) were elected to replace Franz Ulm, Ph.D., F.EMI (M.I.T) and Alex Cheng, Ph.D., F.EMI (University of Mississippi). Roberto Ballarini, Ph.D., F.EMI, F.ASCE (University of Minnesota) was elected by the new EMI Board to serve as the EMI President in FY 2014. Roger Ghanem will serve as Past President in FY 2014. Hayley H. Shen, Ph.D., F.EMI (Clarkson University) stepped down as the ASCE-appointed Governor. She was replaced by Dan Frangopol, Ph.D., P.E., F.SEI, F.EMI, Dist.M.ASCE (Lehigh University).

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!

### **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, EMI journals subscriptions, and EMI conference and webinar registrations; the ability to nominate members for elected positions on the EMI Board of Governors, 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.

It should be emphasized however that the main reason for becoming a member of EMI is the desire to become part of a community that one identifies with, and wants to interact with and contribute to.

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 (graduate) student members;
- For ASCE members, free 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](#).

EMI pursued its efforts to attract and retain younger members through low membership fees for graduate students, student competitions, and the recently established EMI Leonardo da Vinci award. EMI membership numbers remained stable (about 2,200). Over 25% of the EMI members reside outside the U.S. (61 countries). About 25% of the EMI members are students, and over 90% of them are in academia or research. EMI counts 10 Distinguished Members of ASCE among its members.

### **Publications**

EMI is proud of its new publications which will help disseminate important new 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](#), 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 two years. There has been a 44% increase in submissions (from 375 to 540), a 33% increase in papers published annually (from 135 to 180), a 50% reduction in acceptance rate (from 51% to 34%), a 20% increase in impact factor and 5-year impact factor (now at 1.2 and 1.4, respectively), and a dramatic decrease in review time to first decision (from 6.7 months to 3.0 months). JEM's progress can be attributed to the leadership of its editor, its ever-increasing reputation as one of the most prestigious mechanics journals, and the hard work, diligence and rigorous paper reviews performed by the Associate Editors and manuscript reviewers.

Roland Pellenq, Ph.D. (M.I.T) replaced Prof. George Voyiadjis, Ph.D., F.EMI, F.ASCE (Louisiana State University) in April 2014 as Editor of the quarterly [Journal of Nanomechanics and Micromechanics](#). Special issues were published in 2014 on Mechanics of Nanocomposites and Nanostructure (Nima Rahbar, Caglar Oskay, and Huiming Yin, Special Issue Editors) and Multiscale Modeling and Simulation of Physical Phenomena of Material Systems (James Chen, James D. Lee, and Xianqiao Wang, Special Issue Editors). JNM's updated focus will include molecular dynamics simulation and multiscale materials modeling of infrastructure materials.

Links to the table of contents of the two EMI journals are regularly included in the monthly EMI newsletter, and members may subscribe to e-mail alerts for the journals table of contents. E-mail delivery of table of contents alerts for ASCE or EMI journals may be activated by visiting <http://ascelibrary.org/action/showPreferences?menuTab=Alerts>. One may also subscribe to the [RSS feeds of ASCE or EMI journals](#) and have titles, authors, and citation data for newly published articles delivered directly to one's desktop.

## Conferences

Prof. Samir Chidiac, Ph.D. (McMaster University) chaired the [EMI 2014 Conference](#) (EMI 2014) held on August 5-8, 2014 at McMaster University in Hamilton, Ontario, Canada. Nearly 300 people attended the event. The technical program featured ten parallel tracks to accommodate approximately 300 presentations. Social events at the conference included an ice breaker reception, a welcome reception, and a banquet and award presentation ceremony.

The conference featured six keynote lectures on the following topics:

- Persistent Shear Band in Unsaturated Porous Materials (Dr. Ronaldo I. Borja, Professor Civil and Environmental Engineering, Stanford University)
- Fracture to Damage Multiscale Mechanics and Modeling (Dr. Jiun-Shyan Chen, William Prager Endowed Chair, Department of Structural Engineering, University of California, San Diego)
- Big Data Analytics for Energy Efficiency of Cities (Dr. Marta C. González, Assistant Professor, Department of Civil & Environmental Engineering, Massachusetts Institute of Technology)
- Mechanics and Computing for Hazard Risk Analysis (Dr. Abani Patra, Professor, Mechanical & Aerospace Engineering, University at Buffalo)
- Modeling of Progressive Damage in Masonry/Concrete Structures within Power Generation Facilities (Dr. Stan Pietruszczak, Professor, Department of Civil Engineering, McMaster University)
- Soft Material Nanomechanics (Dr. Ishwar K. Puri, Dean, Faculty of Engineering, and Professor, Mechanical Engineering, McMaster University)

The six keynote lectures were recorded and will be posted on the new EMI web site.

Three student competitions were organized by the Probabilistic Methods, Computational Mechanics, and Dynamics committees of EMI, in addition to a general student poster competition. All the EMI technical committees met at the conference, as did the Editorial Board of the *Journal of Engineering Mechanics* and the EMI Board of Governors.

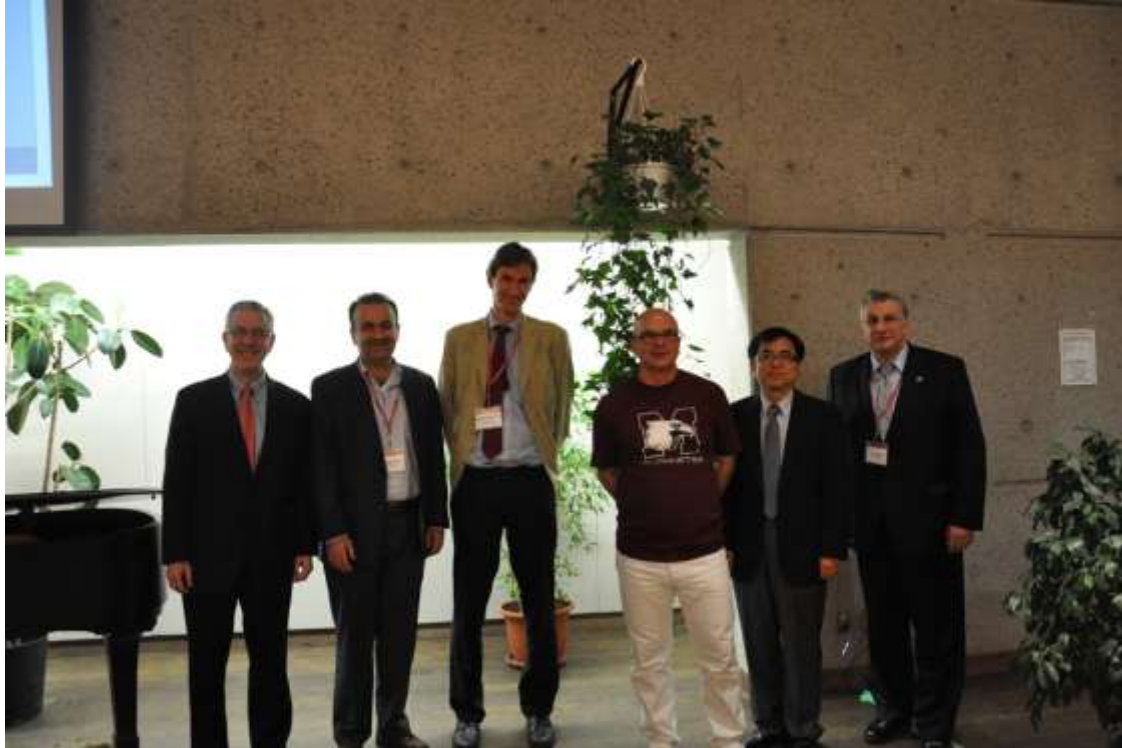
Many attendees took advantage of the special offer on the occasion of the conference to become EMI members. By all accounts, the EMI 2014 conference was a clear success. A [photo gallery](#) of the EMI 2014 conference and associated activities is posted on the Internet. Many thanks to Prof. Samir Chidiac of McMaster University and his team for organizing and hosting an excellent conference!



The award ceremony also featured the recognition of the 2014 class of EMI Fellows. (See below a group photo of the new Fellows of EMI present at the event.)

### Local Activities

EMI helped establish in 2011 the [Engineering Mechanics Committee within the ASCE Met Section](#). The committee organized in 2014 two major events at Columbia University, the [Biot Lecture](#) and the [Mindlin Lecture](#). The Engineering Mechanics Committee of the ASCE Met Section organized two major events at Columbia University: the 2013 Biot Lecture, presented by Prof. Ronaldo Borja, Ph.D., M.ASCE, (Stanford University) on November 7, 2013, titled "Persistent Shear Bands in Unsaturated Porous Media" and the 2014 Mindlin Lecture, presented by Prof. Zhigang Suo (Harvard University) on May 6, 2014, titled "Soft Machines." The videos of these and other lectures will be posted on the redesigned EMI website.



*L to R: Ray Daddazio, Muhammad Hajj, Christian Hellmich, Roberto Ballarini, Lizhi Sun, Amar Chaker.*

### **Continuing Education**

The short course on “Mechanics of Random and Fractal Materials and Structures” given by Prof. Martin Ostoja-Starzewski (University of Illinois at Urbana-Champaign) at the EMI 2013 conference at Northwestern University was recorded on video and is now offered as a [video-on-demand short course](#) through ASCE’s Continuing Education services. The webinar given by Prof. Markus Buehler (M.I.T.) on “Failure of Molecules, Bones, and the Earth Itself: Nanotechnology and Bio-inspired Materials in Civil Engineering” is also offered as a [video-on-demand webinar](#).

### **Awards**

EMI expanded its extensive [awards program](#) with the creation of the Masanobu Shinozuka Stochastic Systems Medal which may be presented in odd years, starting in 2015.

Except as noted, the winners of the prestigious Society Awards were recognized on August 7 at the banquet and award presentation ceremony of the EMI 2014 Conference:

#### **2014 MAURICE A. BIOT MEDAL**

Arnold Verruijt, D.Sc. (Professor Emeritus at Delft University of Technology) was awarded the 2014 Maurice A. Biot Medal *“for his pioneering contributions to the theory of poroelasticity and the development of original analytical and numerical methods for solving problems of poroelasticity in soil mechanics and groundwater flow.”*

#### 2014 FREUDENTHAL MEDAL

Jie Li, Ph.D. (Distinguished Professor, Tongji University) was awarded the 2014 Freudenthal Medal *“for the development of the probability density evolution methods and contributions to seismic reliability based design of large scale civil infrastructure systems.”*

#### 2014 GEORGE W. HOUSNER MEDAL 2014

Hirokazu Iemura, Ph.D. (Professor Emeritus at Kyoto University) was awarded the 2014 George W. Housner Medal *“for pioneering research in the development and implementation of seismic response control systems, as well as for his unwavering commitment to education and professional service.”*

#### 2014 RAYMOND D. MINDLIN MEDAL

J.N. Reddy, Ph.D. (Distinguished Professor and Wyatt Chair, Texas A&M University) was awarded the 2014 Raymond D. Mindlin Medal *“for outstanding contributions to the development of higher-order shear deformation theories of beam, plates, and shells and their computational models.”*

#### 2014 NATHAN M. NEWMARK MEDAL

Herbert A. Mang, Ph.D., F.ASCE (Professor Emeritus, Vienna University of Technology) was awarded the 2014 Nathan M. Newmark Medal *“for his outstanding research contributions in the area of nonlinear continuum and computational mechanics that clarified the cause of collapse of important concrete structures and quantified the influence of bending on the initial postbuckling behavior of metallic structures.”* The 2014 Nathan M. Newmark Medal was presented to Dr. Mang at the 2014 Structures Congress.

#### 2014 THEODORE VON KÁRMÁN MEDAL

James R. Rice, Ph.D., F.EMI, M.ASCE (Professor, Harvard University) was awarded the 2014 Theodore von Kármán Medal *“for his fundamental contributions to mechanics and its engineering applications.”* The 2014 Theodore von Kármán Medal will be presented to Dr. Rice at the EMI 2015 Conference at Stanford University.

#### 2014 JACK E. CERMAK MEDAL

Kishor C. Mehta, Ph.D., P.E., Dist.M.ASCE, NAE, was awarded the 2014 Jack E. Cermak Medal *“for outstanding contributions to wind engineering, particularly for systematic studies of structural damage caused by windstorms and leadership in the development of structural design standards for wind loads.”* Dr. Mehta received the award at the ASCE Global Engineering Conference 2014, Panama City, Panama, October, 7-11, 2014.

#### The 2014 ASCE CROES MEDAL

Sunyong Kim, Ph.D., M.ASCE, Dan M. Frangopol, Sc.D., P.E., F.SEI, F.EMI, Dist.M.ASCE, (EMI Governor) and Mohamed Soliman, S.M.ASCE have been selected by the Society Awards Committee to receive the 2014 J. James R. Croes Medal for their paper *“Generalized Probabilistic Framework for Optimum Inspection and Maintenance Planning,”* published in the March 2013 issue of the *Journal of Structural Engineering*. The award was presented during the ASCE Global Engineering Conference 2014, Panama City, Panama, October, 7-11, 2014.

A 2014 Walter L. Huber Civil Engineering Research Prize was awarded to Jerome P. Lynch, Ph.D., M.ASCE (Associate Professor, University of Michigan) *“for extraordinary leadership in the advancement of*

*structural health monitoring technology in civil engineering through academic research in sensing technology, damage detection algorithms, and decision support systems.*" The award will be presented to Dr. Lynch at the EMI 2015 Conference at Stanford University.

The 2014 EMI Leonardo da Vinci Award was presented to Haim Waisman, Ph.D. (Associate Professor, Columbia University) *"for his outstanding contribution to Computational Fracture and Damage Mechanics by developing novel computational methods (such as eXtended Finite Element Methods (XFEM), multi-grid and multiscale methods and mixed finite element methods) that advance the understanding, modeling capabilities and applications of Fracture Mechanics to important engineering mechanics problems at diverse length and time scales."*

The finalists and winners of the student competitions were also presented with certificates. They are:

*Computational Mechanics:* 1) Matthew PIKE, Vanderbilt University; 2) Hao Sun, Columbia University, Ravi Kiran, The University of Notre Dame, and Brandon Karchewski, McMaster University (tied).

*Probabilistic Methods:* had after all two winners: 1) Ji Yun Lee; 2) Charanraj Thimmisetty.

*Dynamics:* 1) Nestor R. Polanco, The University of Vermont, College of Engineering and Mathematical Sciences; Farzad Nikfar, McMaster University, Department of Civil Engineering.

## **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.

Until the mid-November 2014, the EMI website had a host of useful features, including:

- A carousel slideshow highlighting current research topics in engineering mechanics and providing videos of keynote lectures given at the EMI conferences.
- A searchable database of a growing number of Research Group Profiles (RGPs) that present a snapshot of the research undertaken by EMI members and an explanation of why what they do matters.
- EMI-specific sections on books and journals, conferences, continuing education, membership, membership benefits, and awards.
- An EMI news section.
- Current and recent issues of the EMI newsletter.
- A calendar of EMI events or events of interest to the EMI membership.
- A searchable section on EMI committees providing automatically updated committee membership rosters and committee charges.
- A page of links of interest, including videos of lectures and keynote presentations
- A job postings section.
- A Frequently Asked Questions (FAQs) section specific to EMI.

The site provided additional valuable material such as presentations and videos of keynote lectures given at EMI conferences and other prestigious lectures, archived EMI newsletters, photo galleries of EMI events, etc. The site also included 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.

Following the complete redesign of the ASCE website to make e-commerce and transactions easier, much of the content valued by the members was eliminated. Some of it may be restored in the future. Also, the EMI newsletter is no longer posted or archived on the EMI section of the new web site.

### **Committees**

The EMI committees continue to do a phenomenal amount of quality work: they review papers submitted for possible publication in one of the two EMI journals; they organize sessions at the EMI annual conference; some of them also organize student paper or poster competitions at the annual conference. Most EMI committees met at the EMI 2014 conference. Many thanks to all our committee chairs and committee members for their continued support of EMI activities! EMI is grateful to the outgoing committee chairs for their dedication and hard work: Somnath Ghosh (Computational Mechanics), Costas Papadimitriou (Dynamics), Yunping Xi (Experimental Analysis and Instrumentation), Linbing Wang (Mechanics of Pavements), and Christian Hellmich (Poromechanics).

### **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 2014 was a net loss of just under \$5K, with an additional \$2K membership income to be credited in calendar year 2015. The net result for FY 2014 will be used to adjust 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.

Looking back at FY 2014, EMI has made significant progress in several areas. EMI is becoming active in local activities, international activities and continuing education, albeit on a small scale. EMI has kept with the tradition of organizing excellent annual conferences and producing content-rich publications. EMI has taken steps to substantially reduce the time to publication for *JEM* and increase submissions to *JNM*. EMI held a successful EMI 2014 conference. EMI's previously recorded short course and webinar are now offered as video-on-demand topics. EMI added a Society award to its awards program and has continued to provide financial support to the student competitions. EMI has provided new content on its website and kept it up to date. It has also kept its members informed through its newsletter. The EMI membership is now electing members of its Board of Governors on a regular basis and has a say in the governance of the Institute.



EMI is clearly a healthy, productive and vibrant organization which has made considerable progress since its founding seven years ago. This is mostly due to the dedication and hard work of its volunteers and the effective support of EMI staff.

In spite of this progress and these accomplishments, EMI needs to improve in other areas: EMI needs to establish better connections to industry and to enhance its continuing education program.

There are many ways EMI members can help the Institute:

- By renewing their membership
- By giving a (tax deductible) voluntary contribution to EMI when renewing their membership
- By encouraging their graduate students and colleagues to join EMI
- By attending the EMI conference
- By getting involved in committee work
- By being responsive to requests for reviews of journal articles
- By suggesting or offering webinars and short courses
- By encouraging organizations they know in industry and government that are users of advanced mechanics to become organizational members of EMI
- By contributing articles to the EMI journals
- By sending short articles, pictures, videos, and announcements for the EMI newsletter and the EMI website
- Etc.

With strong support, engagement and participation from its members, I am confident that EMI will become stronger and maintain excellence in all of its activities and products and that EMI membership will remain a compelling proposition.

Respectfully submitted,

Roberto Ballarini, Ph.D., P.E., F.EMI, F.ASCE, EMI President, FY 2014