EARTHQUAKE ENGINEERING RESEARCH INSTITUTE

Founded in 1948, EERI's mission is to reduce earthquake risk by (1) advancing the science and practice of earthquake engineering, (2) improving understanding of the impact of earthquakes on the physical, social, economic, political, and cultural environment, and (3) advocating comprehensive and realistic measures for reducing the harmful effects of earthquakes.

-USGS Presentation on Induced Seismicity Added to Annual Meeting

Beyond the Ep center
Expanding Our Risk Perspective

EERI 68th Annual Meeting
San Francisco, California
April 5-8, 2016
The Earthquake Engineering Research Institute will hold its 68th Annual Meeting, April 5–8, 2016, in San Francisco, California.

With a theme of "Beyond the Epicenter: Expanding Our Risk Perspective," the meeting program will delve into unanticipated effects, blind spots, and new insights in earthquake engineering. Just added to the opening plenary session is a presentation by Mark Petersen (M. EERI, 2002) on the new USGS model on induced seismicity, scheduled for release at the end of March. Petersen is chief of the USGS National Seismic Modeling Project, which forecasts the ground shaking hazard in the United States due to natural or human activity.

For program, logistic, and registration details, visit the 2016 Annual Meeting website.

NEWS OF THE INSTITUTE

EERI Outstanding Student Paper Awardees: Reagan Chandramohan and Nathan Jo

The purpose of the EERI Outstanding Student Papers Competition is to promote active involvement of students in earthquake engineering and the earthquake hazards community. Graduate and undergraduate students compete by submitting papers that are original work. The papers are judged based on their contribution to the field and their overall quality.

Each paper is ranked on technical merit, clarity of expression, and relevance for the earthquake engineering community. Following synthesis of individual judge rankings, the Student Activities Committee chooses undergraduate and graduate student winners.

The following students were awarded 2015 EERI Outstanding Graduate and Undergraduate Papers. Winners will receive recognition at the 2016 EERI Annual Meeting opening plenary.

Graduate Student Paper Award

"A Structural Reliability Framework for Collapse Risk Assessment Incorporating Ground Motion Duration and Response Spectral Shape"

Reagan Chandramohan, Stanford University

Reagan Chandramohan (M. EERI, 2014) is a Doctoral Candidate in the Department of Civil and Environmental Engineering at Stanford University. He is investigating the influence of earthquake ground motion duration on the seismic collapse risk of structures, under the guidance of professors Gregory Deierlein (M. EERI, 1989) and Jack Baker (M. EERI, 2004). His research helps accurately quantify the risk posed by earthquakes to our networks and infrastructure, especially at sites located near active subduction zones around the world, which are known to produce large magnitude earthquakes of extremely long duration, e.g. the US Pacific Northwest, Japan, Northern India, and...
New Zealand. He has demonstrated that structures designed for such sites, without due consideration of the effect of ground motion duration, have lower margins of safety against collapse. He is also exploring methods to incorporate the effect of ground motion duration in current structural performance assessment and seismic design standards.

**Paper Abstract:** A structural reliability framework is developed to post-process the results of an incremental dynamic analysis (IDA) and compute a hazard-consistent collapse fragility curve. The ability to produce hazard-consistent collapse risk estimates eliminates a major drawback in the IDA procedure and brings its capabilities on par with multiple stripe analysis (MSA). The proposed framework uses two secondary ground motion intensity measures: $S_9$ Ratio, which is used to quantify response spectral shape and 5-75% significant duration ($D_{5-75}$). Both $S_9$ Ratio, and $D_{5-75}$ are demonstrated to be efficient predictors of a ground motion's collapse intensity, which is a measure of its potential to cause structural collapse. In the case of the ductile eight-story reinforced concrete moment frame building analyzed in this study, they are capable of explaining 81% of the variance in the ground motion collapse intensities. The collapse fragility curve estimated using this framework is found to compare well to the fragility curve obtained by conducting MSA using hazard-consistent ground motions. MSA is shown to represent a simulation-based approach to solve the same structural reliability problem. Finally, optimal ground motion selection strategies to produce accurate collapse risk estimates are proposed.

**Undergraduate Student Paper Award**

"Energy-Based Design Method for Seismic Isolators in Highway Bridges"

**Nathan Jo, CSU-Pomona**

Nathan Jo (M. EERI, 2015) is an undergraduate senior at California State Polytechnic University, Pomona. His research investigates the feasibility of energy-based design methods for seismic isolation systems. Nathan's passion for earthquake-damage mitigation stems from his internship in structural engineering for single-family residential projects and his concern for public safety in earthquake-prone areas around the world. Nathan is currently the Co-Chairman of the Younger Members Committee of the Structural Engineers Association of Southern California.

**Paper Abstract:** Traditional force-based and displacement-based methods for the design of seismic isolation systems use simplifying assumptions to account for the nonlinear behavior of seismic isolators. This results in inaccurate predictions of the structures response during earthquakes. As an alternative to overcome the limitations of traditional methods, energy can be set as the main criterion in the design of seismic isolators. In this study, an energy-based design method is applied to a seismic isolation system to include the nonlinear behavior of seismic isolators; thus, simplified assumptions to predict the force-displacement demand on the structure are avoided. This method is applied to a four-span highway bridge with seismic isolators atop the three columns and at the abutments. A set of nonlinear structural analyses is performed through computer software to assess the abilities of the traditional versus energy-based design methods to accurately predict the response of the structure during earthquakes. Based on the analyzed cases, the proposed energy-based design method resulted with more accurate predictions in force and displacement demands than traditional methods did. The proposed method also effectively confined all plastic deformations into the seismic isolators while the columns and deck remained elastic and undamaged.
Understanding Building Code Implementation: EERI Housner Fellows Travel to Nepal

The 2014 Class of EERI Housner Fellows will travel to Nepal this month to conduct fieldwork as part of their group project, *Strengthening Building Code Enforcement in Developing Countries: A Case Study of Nepal*. The primary purpose of the fieldwork is to gain a broader understanding of the issues around building code adoption and compliance in Nepal.

During the Nepal field study, the Housner Fellows will conduct workshops and interviews with relevant stakeholders in Nepal to elicit information about the current status, future plans, challenges and opportunities around the issue of building code implementation, and compliance within and outside Kathmandu Valley. These workshops and interviews will facilitate dialogue between the Housner Fellows and a range of local stakeholders including homeowners, engineers, masons, and local and national officials. The Fellows have been coordinating closely with colleagues from the National Society of Earthquake Technology (NSET) in Nepal to plan activities during their trip and connect with relevant stakeholders in the region.

The *Housner Fellow Program*, named after EERI founder George Housner, and funded in part by the Global Facility for Disaster Risk Reduction of the World Bank and the US Federal Emergency Management Agency, equips a select group of promising and motivated professionals worldwide to lead and advocate for efforts to reduce earthquake risk. EERI Housner Fellows benefit from training, mentorship, networking, and from the execution of a group project.

Read more about the 2014 Housner Fellows

New EERI Post-Graduate Intern: Shizza Fatima

The Institute is delighted to introduce *Shizza Fatima* (M. EERI, 2015), a new intern now working at the EERI office in Oakland, California.

Shizza is a recent graduate from Johns Hopkins University with a BS in civil engineering. She fell in love with structures during her undergraduate study and, as a part of her senior year thesis, she designed a student building next to Thomas Jefferson’s iconic Rotunda at the University of Virginia. She also gained valuable experience in transportation engineering through an internship in Islamabad, Pakistan, where she was involved in road and highway design in the city. Shizza was named a C. Corner Brownley Scholar at Johns Hopkins and she received the Civil Engineering Faculty Recognition Award in May 2015 from the Johns Hopkins Whiting School of Engineering for academic excellence and community leadership.
At EERI, Shizza is excited to work on the World Housing Encyclopedia, Confined Masonry Network, and the School Earthquake Safety Initiative. She hopes to contribute to the earthquake engineering community through her efforts. She will be applying to graduate schools for admission in Fall 2017 to pursue a master's degree focused on structural engineering and seismic design.

EERI will soon say goodbye to intern Cherry Chan (M. EERI, 2014), who has been instrumental in helping EERI develop an online data archive for the 2014 South Napa Earthquake. She has made significant progress in improving data archiving and mapping protocols for EERI. Cherry is currently seeking an entry-level position in GIS, and is strongly recommended by EERI staff. You can view her portfolio at http://cherrychan.xyz Those interested in reaching Cherry about employment opportunities should contact Maggie Ortiz at maggie@eeri.org

EERI provides interns with multi-disciplinary professional experience and the opportunity to collaborate and network with others within the earthquake engineering profession. Each intern focuses on a specific endeavor of EERI. Their roles, both in tandem and separately, further the Institute's mission to gather and disseminate information about earthquake risk reduction and advocate for realistic measures to reduce the harmful effects of earthquakes.

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**NEWS OF THE PROFESSION**

- **Links to Recent News and Views**

  Ten recent stories, reports, or opinions from around the Web:

  1. **7.1 quake shook different parts of Anchorage in very different ways** (Alaska Dispatch) January 24 quake data surprises researchers. [https://www.adn.com](https://www.adn.com)

  2. **Alaska earthquake jolts Anchorage** (Alaska Dispatch) Shaking a good reminder of the important work civil engineers do: “It was gratifying.” [https://www.adn.com](https://www.adn.com)

  3. **Scientists try to decipher signatures of past earthquakes** (Economic Times) Studying stalagmites to expand knowledge on Himalayan earthquake risk. [http://economictimes.indiatimes.com](http://economictimes.indiatimes.com)

Nepal formally begins much delayed earthquake reconstruction (Washington Post) Nine months after quake, official launch of reconstruction of about 1 million homes and buildings. https://www.washingtonpost.com


Wastewater disposal volumes rose 81 percent in six years as earthquakes rumbled more frequently (Tulsa World) Study documents "most concerning culprit" of Oklahoma quakes. http://www.tulsaworld.com

Oklahoma representative to introduce amendments regarding earthquakes increase (OU Daily) Reimbursing for earthquake insurance and making the Oklahoma Geological Survey a stand-alone agency. http://www.oudaily.com

L.A. landlords and tenants will share earthquake retrofit costs (LA Times) Deal means city can begin implementing the most sweeping mandatory seismic laws in the nation. http://www.latimes.com

Valley's dingbat apartment buildings will benefit from new earthquake law (Los Angeles Daily News) Boxy apartment buildings with quirky mid-century charm are targets for LA soft-story strengthening. http://www.dailynews.com

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LEARNING FROM EARTHQUAKES

Reconnaissance Reports from Oct 2015 Afghanistan-Pakistan Earthquake Now Available

Two short reports of reconnaissance observations on the M7.5 earthquake in Northeastern Afghanistan of October 26, 2015, are now posted on the EERI Learning from Earthquakes (LFE) archive page for the event:

- "Strong Ground Motions and Behavior of Buildings During the 26th Oct. 2015 Afghanistan–Pakistan Earthquake" by Dr. Naveed Ahmad, University of Engineering and Technology Peshawar, Pakistan. | PDF

- "Reconnaissance report on the Mw 7.5 Hindu Kush earthquake of 26th October 2015 and the subsequent aftershocks" by Najif Ismail (M. EERI, 2015) and Nouman Khattak, United Arab Emirates University, United Arab Emirates. | PDF

In addition to the two reports above, the LFE archive web page for the event also features links to media reports, information from the U.S. Geological Survey, World Housing Encyclopedia reports, and information from the 2005 Kashmir Earthquake.

Read more on the LFE archive page for the October 26, 2015 earthquake
ANNOUNCEMENTS

Building Seismic Safety Council NEHRP and Project 17 Colloquium on March 8

The National Institute of Building Sciences Building Seismic Safety Council (BSSC) will host the second annual BSSC Colloquium: Seismic Design Update 2016: An Interactive Exploration of the 2020 NEHRP Provisions and Project 17 Issues, on March 8, 2016, in Burlingame, California from 10:00 am to 5:30 pm.

Covered topics will include introduction to NEHRP, design and analysis; geotechnical/ground motion; concrete, masonry, and wood provisions; nonstructural components; nonbuilding structures; uncertainty vs. precision; acceptable risk; multi-period spectral parameters; and deterministic caps. The course will offer 6.0 Continuing Education Units (approval is pending from The American Institute of Architects for AIA learning units).

This year's colloquium also will feature a two-hour workshop on “Public Input on Issues for The 2020 NEHRP Provisions.” David R. Bonneville (M. EERI, 1988), senior principal of Degenkolb Engineers and chair of the Provisions Update Committee (PUC), will facilitate an audience-based, open discussion on topics and issues that should be considered by the Provisions Update Committee in the 2020 Provisions cycle.

Registration, full agenda, and list of distinguished speakers are available on the BSSC web page: http://www.nibs.org/?page=bssc_colloquim2016

Western U.S. Dam Safety Conference March 9-11


The conference will focus on the state of the practice, and explore the state of the art, for seismic design of dams in the western United States. From the aspiring professional to the seasoned engineer, this specialty conference promises to share the expertise and experience of internationally-recognized seismic design and dam engineering experts. Registration and more information on the conference web page.

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This report investigates the issue of selecting and scaling ground motions as input excitations for response history analyses of buildings in performance-based earthquake engineering. Many ground motion selection and modification (GMSM) procedures have been developed to select ground motions for a wide variety of objectives. This report focuses on the selection and scaling of single, horizontal components of ground motion for estimating seismic demand hazard curves (SDHCs) of multistory frames at a given site.

Read the complete abstract and browse the full list of PEER reports from the past year.

Earthquake Spectra: Preprint Manuscript

A new preprint manuscripts have been posted to the Earthquake Spectra website prior to formal publication. The paper to be published is:

- "Modular Analytical Solutions for Foundation Damping in Soil-Structure Interaction Applications" by Michael Givens (M. EERI, 2014), George Mylonakis (M. EERI, 1996), and Jonathan P. Stewart (M. EERI, 1994)

To read all current preprint manuscripts posted, visit Earthquake Spectra preprints.

Follow these steps to add EERI Calendar to your own Google calendar.

1. Open Google Calendar
2. On the left, above "My Calendars," click Add + and then From URL.
3. Enter the EERI calendar's address in the field provided. EERI Calendar ics link
https://calendar.google.com/calendar/ical/eeri.org_s9151tit0ab26dnf2epn25d7rg%40group.calendar.google.com/public/basic.ics

4. Click Add Calendar. The calendar will appear on the left side under "Other calendars."

Monday, April 27, 2020 - April 30
**SSA 2020 Annual Meeting**
SSA 2020 Annual Meeting
27-30 April 2020 — Albuquerque, New Mexico
The 2020 Annual Meeting will be held in Albuquerque, New Mexico.
Check back later for more information.

Friday, May 15 2020 5:00 PM - May 16 2:00 AM
**2020 Los Angeles Tall Buildings Conference**
The 2020 Los Angeles Tall Buildings Structural Design Council conference will cover a variety of topics related to recent advances in structural design of tall and special buildings. Learn more: www.latallbuildings.org

Monday, September 14, 2020 - September 18
**17th WCEE**
The 17th WCEE will be hosted in Sendai, Japan, from September 14th to 18th 2020. Check http://www.iaee.or.jp/ for more information.

Sunday, February 07, 2021 - February 10
**ASCE/UCLA San Fernando Earthquake Conference**
For more information: http://lifelines2021.ucla.edu/