FRIEDMAN FAMILY VISITING PROFESIONALS PROGRAM

Visit to Rice University: April 23, 2021

This report summarizes the visit of **Mr. Ron Eguchi** from ImageCat Inc. that took place at the Rice University on April 23rd 2021,

ITINERARY OR AGENDA

TIME:	ACTIVITY:
1:45 PM – 2:30 PM	Meeting with Civil and Environmental Engineering graduate students for technical discussion on ongoing research projects
2:45 PM – 4:00 PM	Guest Lecture by Mr. Ron Eguchi

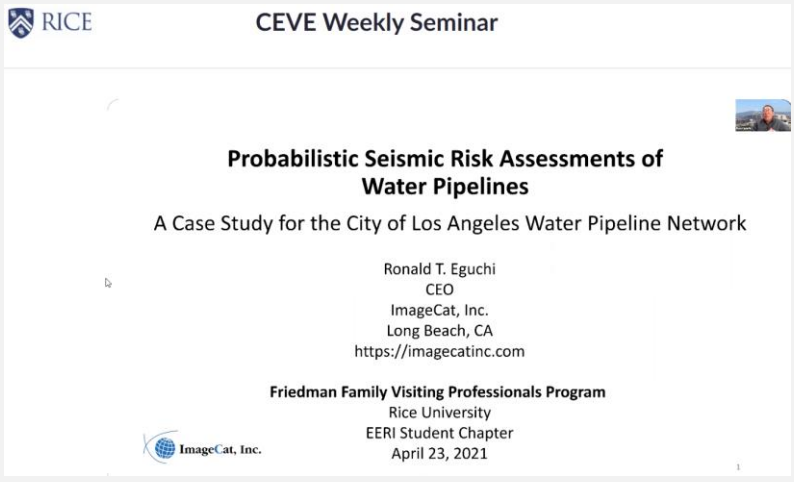
STUDENT CHAPTER VISIT PLANNING COMMITTEE

LEAD ORGANIZER(S): Anibal Tafur, Chapter President, tafur@rice.edu

- Catalina Gonzalez, Chapter Vice-President, cdg7@rice.edu
- Jamie Padgett, Chapter Faculty Advisor, jamie.padgett@rice.edu

VISITING PROFESSIONAL LECTURE OVERVIEW

Mr. Eguchi delivered a very interesting and relevant lecture entitled **"Probabilistic Seismic Risk Assessments of Water Pipelines"**, coordinated to take place as part of our Department Seminar series, which allowed the lecture to reach most of the Civil and Environmental Engineering graduate students and faculty at our university. The attendance was in the order of 50 people and was presented using the Zoom Webinar platform, followed by an open Q&A block.



Lecture Abstract

A seismically-resilient water lifeline system is critical for ensuring effective post-event response and rapid community recovery after disastrous earthquakes. To design, construct, and maintain seismically-resilient water systems, it is crucial that the damage potential of a pipeline system be quantified in future earthquakes. Mitigation strategies to address known vulnerabilities are essential in ensuring that system performance goals and criteria can be achieved with available resources. To assess the damage potential of a large water pipeline network, the following factors must be addressed: regional seismicity, spatial distribution of earthquake-induced shaking, and ground deformation (event footprint) in future events, pipeline fragilities, and agency resources for emergency response. In this study, a large stochastic catalog of earthquake simulations, or an "event set," that adapts the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) model is developed to represent the regional seismicity of the Los Angeles Basin. Random event footprints for each earthquake simulation are constructed by utilizing empirical ground motion models (GMMs) that are consistent with the 2014 United States Geological Survey (USGS)'s National Seismic Hazard Mapping Project (NSHMP). This set of earthquake simulations captures the large uncertainties in seismic hazard models than simplified methods and is utilized to evaluate system-level consequences for the entire City of Los Angeles water pipeline network, measured by the total number of pipeline repairs and subsequent repair costs and times due to strong ground shaking and ground deformations. These estimates of damage and impact are based on empirical pipeline fragility models and restoration data from two past events that affected the water system in the past (1971 San Fernando and 1994 Northridge Earthquakes). System-level performance is then evaluated at various targeted probability levels and influential seismic sources are identified. This study was performed as part of a long-term program administered by the City of Los Angeles Department of Water and Power to quantify and ultimately enhance the seismic resilience of all city trunklines and distribution pipelines.

Professional Bio

Mr. Eguchi is President and CEO of ImageCat, Inc., an international risk management company that supports the global risk and catastrophe management needs of the insurance industry, governments and NGOs. Mr. Eguchi has over 30 years of experience in risk analysis and risk reduction studies. He currently serves or has served on several editorial boards including EERI's Journal SPECTRA. In 1997, he was awarded the ASCE C. Martin Duke Award for his contributions to the area of lifeline earthquake engineering. In 2006, he accepted an ATC Award of Excellence on behalf of the ATC-61 project team for work on An Independent Study to Assess Future Savings from Mitigation Activities that showed that a dollar spent on hazard mitigation saves the nation about $4 in future benefits. He was recognized by EERI as the 2008 Distinguished Lecturer where he discussed the topic of "Earthquakes, Hurricanes, and other Disasters: A View from Space." In 2015, he founded the Technical Committee on Advances in Information Technologies for the SEI Division of ASCE. He has authored over 300 publications, many of them dealing with the seismic risk of utility lifeline systems and the use of remote sensing technologies for disaster response. He was awarded the 2017 Civil & Environmental Engineering Department Distinguished Alumnus Award from UCLA.

SUPPLEMENTAL ACTIVITES

Meeting with graduate students for research discussion

A virtual meeting with three doctoral students from the Civil and Environmental Engineering Department took place before the main lecture, where the students presented a brief summary of their ongoing research activities, followed by a highly technical discussion with Mr. Eguchi. These three students were chosen based on the relevance of their research topics with Mr. Eguchi's expertise and were given the unique opportunity to receive personal feedback from a renowned professional in the earthquake engineering field.

RESULTS, FEEDBACK AND LESSONS LEARNED

- It is worth mentioning that initially Mr. Eguchi's visit was scheduled for April 3rd, 2020. This initial event included a trip to the Rice University campus in Houston, Texas. Nevertheless, the visit was canceled due to the COVID-19 pandemic.
- The main challenge during the event was that it had to be organized to take place virtually due to the COVID-19 pandemic. This significantly reduced the personal interaction initially intended for this event, nevertheless, the technical discussion and content of the visit kept up to the initial expectations.
- The reception to Mr. Eguchi's visit was significant, in both size and interest. The guest lecture was received with high attendance, followed by more than 20 minutes of questions and answers. Several students took interest in a personal meeting with Mr. Eguchi and three students were chosen to personally discuss their research with him in a separate technical meeting.
- For a future visit the Student Chapter would like to receive lectures on topics such as seismic rehabilitation of structures and seismic protection devices.

ACKNOWLEDGEMENTS

The Rice University EERI Student Chapter gratefully acknowledges the support of the Friedman Family for sponsoring the visit of Mr. Ron Eguchi through their Friedman Family Visiting Professional Program endowment.

LIST OF ATTACHMENTS

Included at the end of this report are various attachments to supplement the information included above. A list of the attachments is included below:

- Item 1, flier for event
- Item 2, link for the recorded lecture at: https://riceuniversity.zoom.us/rec/play/g6H0lufxH-OjlhGhM339QA_d24Vrry1VVMSGiNtU6MbENf306bcqXFXsGgwEdYQLgr_aAEnuqB8dxlxZ.qm1aTeDoQOHc4PDN

Made possible by the EERI Friedman Family Visiting Professionals Program and hosted by the EERI Student Chapter at Rice University

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

SEMINAR

Seismic Risk Evaluation of Water Supply Systems

Ronald T. Eguchi
President & CEO
ImageCat

Friday, April 23, 2021
2:45 PM – Virtual Seminar

Abstract: A seismically-resilient water lifeline system is critical for ensuring effective post-event response and rapid community recovery after disastrous earthquakes. To design, construct, and maintain seismically-resilient water systems, it is crucial that the damage potential of a pipeline system be quantified in future earthquakes. Mitigation strategies to address known vulnerabilities are essential in ensuring that system performance goals and criteria can be achieved with available resources. To assess the damage potential of a large water pipeline network, the following factors must be addressed: regional seismicity, spatial distribution of earthquake-induced shaking, and ground deformation (event footprint) in future events, pipeline fragilities, and agency resources for emergency response. In this study, a large stochastic catalog of earthquake simulations, or an "event set," that adapts the Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) model is developed to represent the regional seismicity of the Los Angeles Basin. Random event footprints for each earthquake simulation are constructed by utilizing empirical ground motion models (GMMs) that are consistent with the 2014 United States Geological Survey (USGS)'s National Seismic Hazard Mapping Project (NSHMP). This set of earthquake simulations captures the large uncertainties in seismic hazard models than simplified methods and is utilized to evaluate system-level consequences for the entire City of Los Angeles water pipeline network, measured by the total number of pipeline repairs and subsequent repair costs and times due to strong ground shaking and ground deformations. These estimates of damage and impact are based on empirical pipeline fragility models and restoration data from two past events that affected the water system in the past (1971 San Fernando and 1994 Northridge Earthquakes). System-level performance is then evaluated at various targeted probability levels and influential seismic sources are identified. This study was performed as part of a long-term program administered by the City of Los Angeles Department of Water and Power to quantify and ultimately enhance the seismic resilience of all city trunklines and distribution pipelines.

Bio: Mr. Eguchi is President and CEO of ImageCat, Inc., an international risk management company that supports the global risk and catastrophe management needs of the insurance industry, governments and NGOs. Mr. Eguchi has over 30 years of experience in risk analysis and risk reduction studies. He currently serves or has served on several editorial boards including EERI's Journal *SPECTRA*. In 1997, he was awarded the ASCE C. Martin Duke Award for his contributions to the area of lifeline earthquake engineering. In 2006, he accepted an ATC Award of Excellence on behalf of the ATC-61 project team for work on *An Independent Study to Assess Future Savings from Mitigation Activities* that showed that a dollar spent on hazard mitigation saves the nation about $4 in future benefits. He was recognized by EERI as the 2008 Distinguished Lecturer where he discussed the topic of *"Earthquakes, Hurricanes, and other Disasters: A View from Space."* In 2015, he founded the Technical Committee on Advances in Information Technologies for the SEI Division of ASCE. He has authored over 300 publications, many of them dealing with the seismic risk of utility lifeline systems and the use of remote sensing technologies for disaster response. He was awarded the 2017 Civil & Environmental Engineering Department Distinguished Alumnus Award from UCLA.