FRIEDMAN FAMILY VISITING PROFESIONALS PROGRAM

Visit to University of Illinois at Urbana-Champaign: April 22, 2019

This report summarizes the visit of **Dr. Annie Kammerer** from Annie Kammerer Consulting and **Mr. Antonio R. Godoy**, Dr. Kammerer's husband, from Antonio R. Godoy consulting, that took place at the University of Illinois at Urbana-Champaign on April 22nd, 2019.

ITINERARY & AGENDA

TIME:	ACTIVITY:
8:45 AM – 9:00 AM	Xulai Xu & Karl Eid pick up Dr. Kammerer and Mr. Godoy from Hyatt Hotel lobby.
9:00 AM – 9:30 AM	Breakfast with EERI Board member, SDC team, student member. 2312 NCEB
9:30 AM – 10:00 AM	Meeting with Prof. Jinhui Yan, 2106 NCEB
10:00 AM – 10:10 AM	Newmark Crane Bay tour
10:10 AM – 10:20 AM	Newmark Concrete Testing Lab tour
10:20 AM – 10:30 AM	Newmark Smart Structure Technology Lab (SSTL) tour
10:30 AM – 11:00 AM	Meeting with Prof. Frank Lombardo, 3110 NCEB
11:00 AM – 12:00 PM	Mr. Antonio Godoy's presentation
12:00 AM – 12:15PM	*Tour of the Engineering Quad, walk to Panera on Green St.
12:15 AM – 1:30 PM	Lunch at Panera with EERI Student Chapter
1:30 PM – 2:00 PM	Meeting with Prof. Youssef Hashash, 2230E NCEB
2:00 PM – 2:30 PM	Meeting with Prof. Bassem Andrawes, 3122 NCEB
2:30 PM – 3:00 PM	Meeting with Prof. Eun Cha, 2207 NCEB
3:00 PM – 3:30 PM	Meeting with Prof. Ahmed Elbanna, 2219 NCEB
3:30 PM – 3:50 PM	Visit of 2nd floor Yeh center, the students' lounge.
3:50 PM – 4:00 PM	Setup and preparation for Structural Engineering Seminar
4:00 PM – 5:00 PM	Structural Engineering Seminar given by Dr. Kammerer, 1310 NCEB
5:00 PM – 5:30 PM	Questions and Answers, group picture, exchange gifts.
5:30 PM – 5:45 PM	Xulai & Karl drive Dr. Kammerer and Mr. Godoy back to Hyatt Hotel.
5:45 PM – 6:30 PM	Dr. Kammerer and Mr. Godoy rest up and prepare for dinner.
6:30 PM – 9:30 PM	Dinner at Destihl with EERI student chapter outreach committee

All activities from 9:30 AM to 3:30 PM were delayed by 5-10 minutes.

**Tour of Engineering Quad was moved to after lunch at 1 pm*

STUDENT CHAPTER VISIT PLANNING COMMITTEE

LEAD ORGANIZER(S):

- Karl Eid, Head of Corporate Outreach Committee, karleid2@illinois.edu
- Xulai Xu, President, xulaixu2@illinois.edu

Co-ORGANIZER(S):

- Kevin Chen, Vice-President, kevinc7@illinois.ede
- Robin De Lara, Social Chair, rdelara2@illinois.edu
- Kevin Di, Representative to the Engineering Council, kevindi2@illinois.edu
- Woongchan Bang, Member of Corporate Outreach Committee, wbang3@illinois.edu
- Prof. Bassem Andrawes, Faculty Advisor, andrawes@illinois.edu
- Prof. Youssef Hashash, Faculty Advisor, hashash@illinois.edu
- Dr. Paolo Gardoni, Director of Structural Engineering Seminar, gardoni@illinois.edu

VISITING PROFESSIONAL LECTURE OVERVIEW

Dr. Kammerer's presentation focused on the seismic design and risk evaluation of nuclear plants. With around 150 students with different engineering backgrounds attending. The attendee response is enthusiastic, thereby sparking interesting conversations.

Lecture Abstract

Since the beginning of the nuclear power industry, the framework and methods used in the seismic design and risk evaluation of the fleet of nuclear power plants in the US has gone through significant change and advancement. This presentation—targeted to the technically- inclined layperson—will cover a wide variety of topics including: basic nuclear plant design concepts (how they work and what can go wrong), why the engineering of nuclear plants is unique and challenging, brief history of seismic regulations, design approaches, and reevaluation efforts, the performance-based and risk-informed methods used in the industry today, the impact of the Fukushima Daiichi accident, including current and future NRC efforts, the NRC, IAEA, and the new global nuclear picture.

Professional Bio

Dr. Annie Kammerer is owner of Annie Kammerer Consulting, a firm specializing in seismic hazard and risk consulting for the nuclear energy sector. She is also the executive director of the Consortium of Organizations of Strong Motion Observation Systems (COSMOS), an applied research organization out of at UC Berkeley. Her work is principally focused on analysis and regulatory processes associated with probabilistic seismic and tsunami hazard and risk assessments for nuclear plants and other critical facilities. Prior to starting her own firm, she was Principal Seismologist for the Bechtel Corporation in San Francisco. Prior to that, she spent 7 years at the US Nuclear Regulatory Commission, where she coordinated the NRC Seismic Research Program. At the NRC, she developed the current US guidance on performing seismic hazard assessments and seismic margin analysis for nuclear facilities. Starting in 2011, Dr. Kammerer was a member of the NRC's seismic technical team developing post-Fukushima response and re-evaluation guidance. From 2012 to 2013, she was also the NRC's technical lead for a special program conducting Seismic Walkdowns of all 104 operating US nuclear plants in response to the Fukushima Daiichi accident. Dr. Kammerer is active internationally and has chaired IAEA Working Groups on seismic re-evaluation of operating reactors, tsunami, and seismic isolation. She holds three degrees from UC Berkeley, including a PhD in geotechnical engineering with minors in strong motion seismology and structural engineering.

Figure 1. Dr. Kammerer during seminar

Figure 2. Audience at Dr. Kammerer's seminar

SUPPLEMENTAL ACTIVITES

Breakfast with EERI Board member

Coffee and several trays of delicatessen and pantries were served as breakfast in 3310 NCEB. Xulai Xu and Karl Eid escorted Dr. Kammerer and Mr. Godoy to the third floor of Yeh center where some of the board members were waiting along with other student members of EERI. Inside 3310 was where the EERI, Dr. Kammerer, and Mr. Godoy broke both bread and ice. After a brief introduction, the members of EERI were regaled by the iconoclastic stories of Dr. Kammerer 's and Mr. Godoy's time as a college student. Properly caffeinated, Dr. Kammerer and Mr. Godoy mingled with the board a little while longer than planned, then departed for their first stop at Prof. Jinhui Yan's office.

Newmark Crane Bay tour

Three laboratories in Newmark were scheduled for a visit, allowing ten minutes each at the Crane Bay, the Concrete Lab, and the Smart Structures Technology Lab (SSTL).

Dr. Kammerer and Mr. Godoy meandered in the Crane Bay with gusto. Karl Eid and Xulai Xu recounted the many large-scale experiments that happened and was happening in the lab. After a short picture time, Dr. Kammerer and Mr. Godoy were led to the concrete lab where a graduate student in materials group gave a brief tour of the mixing lab, area for strength tests, and area for slump test. The tour continued in the SSTL where a six-degrees of freedom ten-feet-by-ten-feet shake table immediately took Dr. Kammerer and Mr. Godoy by surprise. Dr. Kammerer and Mr. Godoy were also apprised of the sensor technology, control systems, and the computer vision practices pioneered in this lab.

Mr. Antonio Godoy's presentation

Mr. Antonio had kindly agreed to deliver a presentation himself as well. As a nuclear plant structural design and assessment expert, his talk focused on the reason why the Fukushima Daiichi Nuclear Accident happened.

Lecture Abstract

The Great East Japan Earthquake occurred on 11 March 2011 in Japan. It was caused by a sudden release of energy at the interface where the Pacific tectonic plate forces its way under the North American tectonic plate. At the Fukushima Daiichi nuclear power plant, operated by the Tokyo Electric Power Company, the earthquake caused damage to the electric power supply lines to the site, and the tsunami caused substantial destruction of the operational and safety infrastructure on the site. The combined effect led to the loss of off-site and on-site electrical power. This resulted in the loss of the cooling function at the three operating reactor units as well as at the spent fuel pools. Despite the efforts of the operators at the Fukushima Daiichi nuclear power plant to maintain control, the reactor cores in Units 1–3 overheated, the nuclear fuel melted, and the three containment vessels were breached. Radionuclides were released from the plant to the atmosphere and were deposited on land and on the ocean. People within a radius of 20 km of the site and in other designated areas were evacuated, and those within a radius of 20–30 km were instructed to shelter before later being advised to voluntarily evacuate. The presentation is focused on the root cause: the external flooding of the plant, with emphasis on which were the original design basis, which were the Japanese regulations, which were the actions taken during the almost 40 years of operation, which assessments were conducted and, finally, the lessons learned to avoid such accidents in future.

Professional Bio

Mr. Godoy is from Argentina, graduated with honors as civil engineer in Buenos Aires University, with forty-five years of experience in the nuclear area which has been his professional main field of activity. His areas of expertise are related to the structural design, the selection and evaluation of sites and the design and safety assessment of nuclear installations, particularly, in aspects related to external events.

His professional career was developed in private engineering and construction companies, independent consultancy and international organizations. In this regard, Mr. Godoy has been involved with the International Atomic Energy Agency, the IAEA, since 1988 as external expert and staff member for fourteen years. He was organizer and leader of over one hundred thirty IAEA safety review missions to countries in all parts of the world, in multidisciplinary expert teams. At IAEA, he was Acting Centre Head and founder of the International Seismic Safety Centre as a global focal point to enhance the safety of nuclear installations worldwide against earthquakes and other external events, until his retirement in 2010.

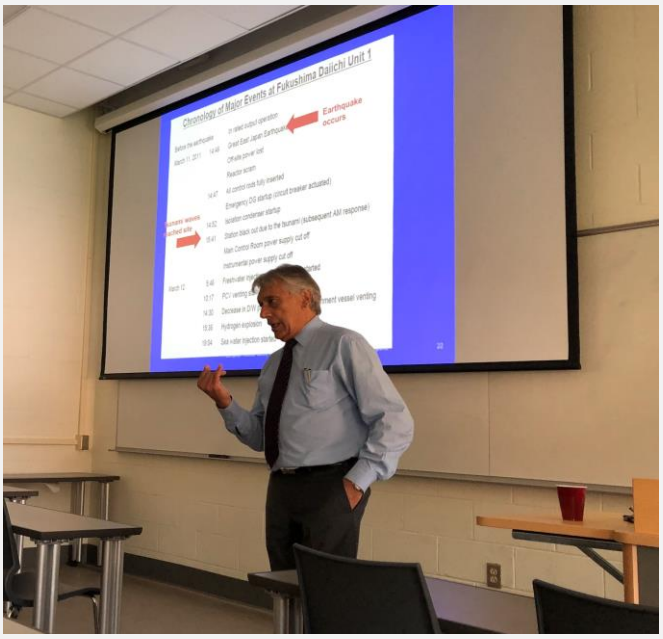


Figure 3. Mr. Godoy during presentation

Figure 4. Audience at Mr. Godoy's presentation

Tour of the Engineering Quad

After lunch at Panera, the board accompanied Dr. Kammerer and Mr. Godoy while strolling pass the Engineering Quad back to Newmark Lab. Several stops were made for Dr. Kammerer and Mr. Godoy to take an adequate number of photos of the idiosyncratic UIUC architecture and the redolent flora that would amaze even the students here. Dr. Kammerer and Mr. Godoy were most interested in the Boneyard Creek that cuts through the Engineering Quad that brings life and vigor into the heart of the College of Engineering. Xulai expounded how hydrology engineering and design directed by a professor in the Civil Engineering department had significantly improved the ecosystem and landscape of the immediate vicinity of the Boneyard Creek.

Figure 5. Xulai showing Dr. Kammerer and Mr. Godoy the Boneyard creek

Dinner at Destihl with EERI student chapter

Over dinner, EERI's board members were able to meet with Dr. Kammerer and Mr. Godoy to learn more about career paths and different work environments. We discussed the different careers between academia, traditional consulting practice and international organizations (like the IAEA). They also further elaborated on how their training and education contributed to their success.

Figure 6. Outreach committee having dinner with Dr. Kammerer and Mr. Godoy

RESULTS, FEEDBACK AND LESSONS LEARNED

Challenges

- Since Purdue and Illinois had applied for Friedman lecture series together, statistically it is hard to find a day suitable for all three parties. Purdue prefers April 16th while Illinois prefers April 22nd. The solution was provided by Dr. Kammerer and Mr. Godoy, who suggested making April 16th the official Friedman lecture date while visiting Illinois on April 22nd at their expenses. Later, the Illinois chapter was able to negotiate with the CEE department to cover Dr. Kammerer 's and Mr. Godoy's travel and living expenses during the April 22nd visit.
- While only applied for Dr. Kammerer, the Illinois chapter was fortunate also to welcome Dr. Kammerer's husband, Mr. Godoy, who agreed to visit Illinois on the same day. Accommodating two speakers in one day was challenging; however, through early and active advertisement by our secretary and outreach committee, both lecture events turned out successful.

Lessons Learned

- An open channel of communication is key to coordination among multiple entities. Making information available to everyone in a clear way is crucial. Within one party, e.g., the Illinois chapter, it is advised to delegate work, information, and responsibilities further to different levels of the organization to avoid hierarchical bottlenecks.
- Devise alternative plans in case of change. Many different scenarios were conceived for free time blocks during Dr. Kammerer's and Mr. Godoy's visit. For example, after the seminar ended at 5 pm, the Illinois chapter had different plans for Dr. Kammerer and Mr. Godoy. Were Dr. Kammerer and Mr. Godoy too tired, the Illinois chapter would have dropped them off back at the hotel to unwind until dinner time. Were Dr. Kammerer and Mr. Godoy still curious about the campus, the chapter members planned to drive them to Café Paradiso for a cup of tea, then to Japan House and the Arboretum to enjoy the pastoral sunset. In the end, Dr. Kammerer and Mr. Godoy chose the former option.

Future Goals

- Due to the lack of time, Dr. Kammerer and Mr. Godoy didn't meet our Seismic Design Competition team and the model we entered for the competition. The future board is recommended to arrange a time with the Seismic Design Competition committee members to determine a half-hour block to meet their visitor(s).
- Due to the lack of time, Dr. Kammerer and Mr. Godoy weren't able to see the rest of the campus other than the CEE department and area of the College of Engineering. A tentative suggestion is given to the next board to entertain their visitor(s) with the rest of the campus if time permits.

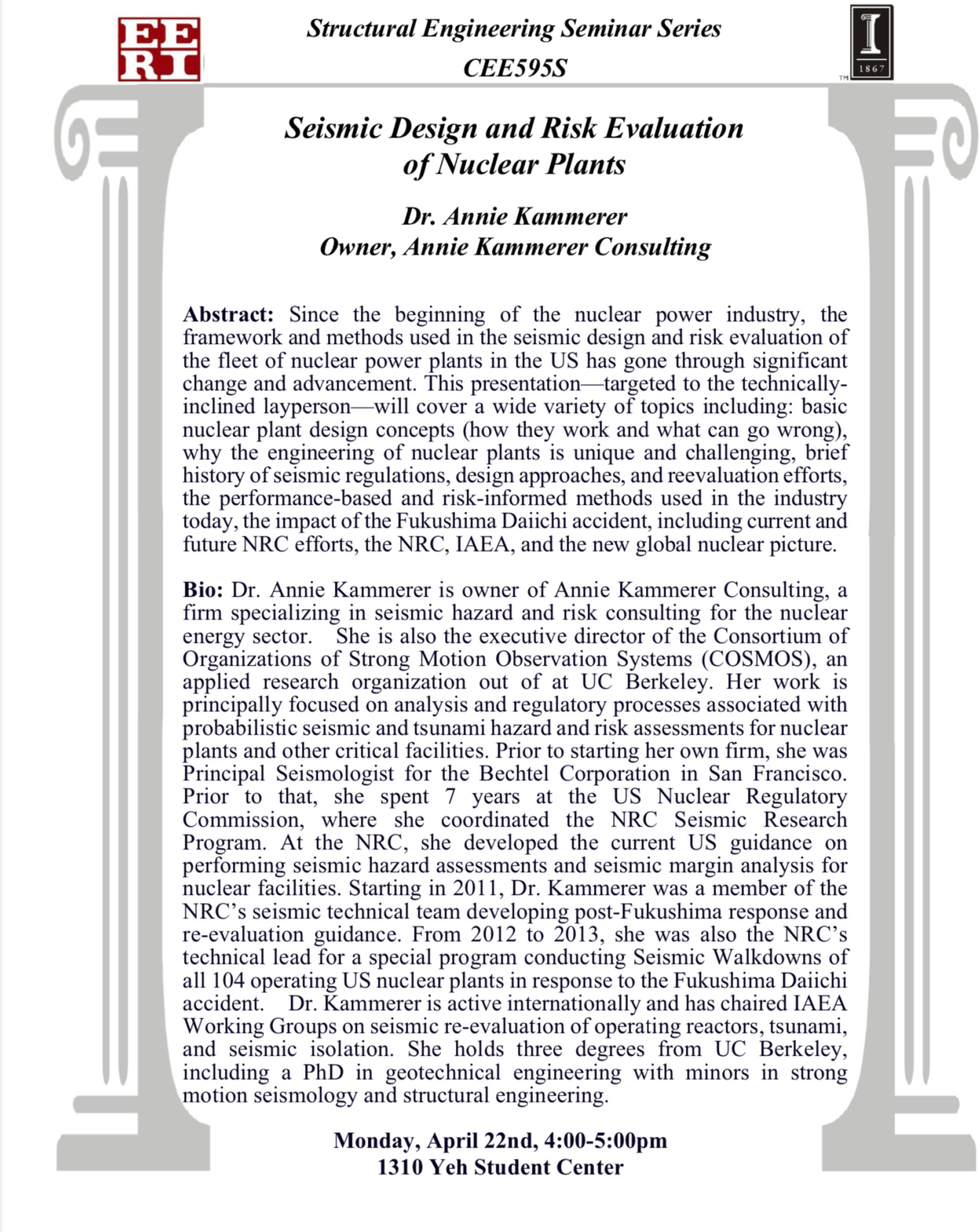
ACKNOWLEDGEMENTS

The University of Illinois at Urbana-Champaign EERI Student Chapter gratefully acknowledges the support of the Friedman Family for sponsoring the travel of Dr. Kammerer and Mr. Godoy through their Friedman Family Visiting Professional Program endowment.
The University of Illinois at Urbana-Champaign EERI Student Chapter gratefully acknowledges the support of the Department of Civil and Environmental Engineering of the College of Engineering for sponsoring the travel and lodging of Dr. Kammerer and Mr. Godoy.

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 Dr. Kammerer seminar
- Item 2, Flier for Mr. Godoy presentation
- Item 3, Initial itinerary sent to Dr. Kammerer, Mr. Godoy, professors, and board members of the chapter
- Item 4, Sample slide of the presentation used at Dr. Kammerer seminar
- Item 5, Sample slide of the presentation used at Mr. Godoy presentation
- Item 6, Screenshot of a video used at Mr. Godoy presentation



Structural Engineering Seminar Series

CEE595S

Seismic Design and Risk Evaluation of Nuclear Plants

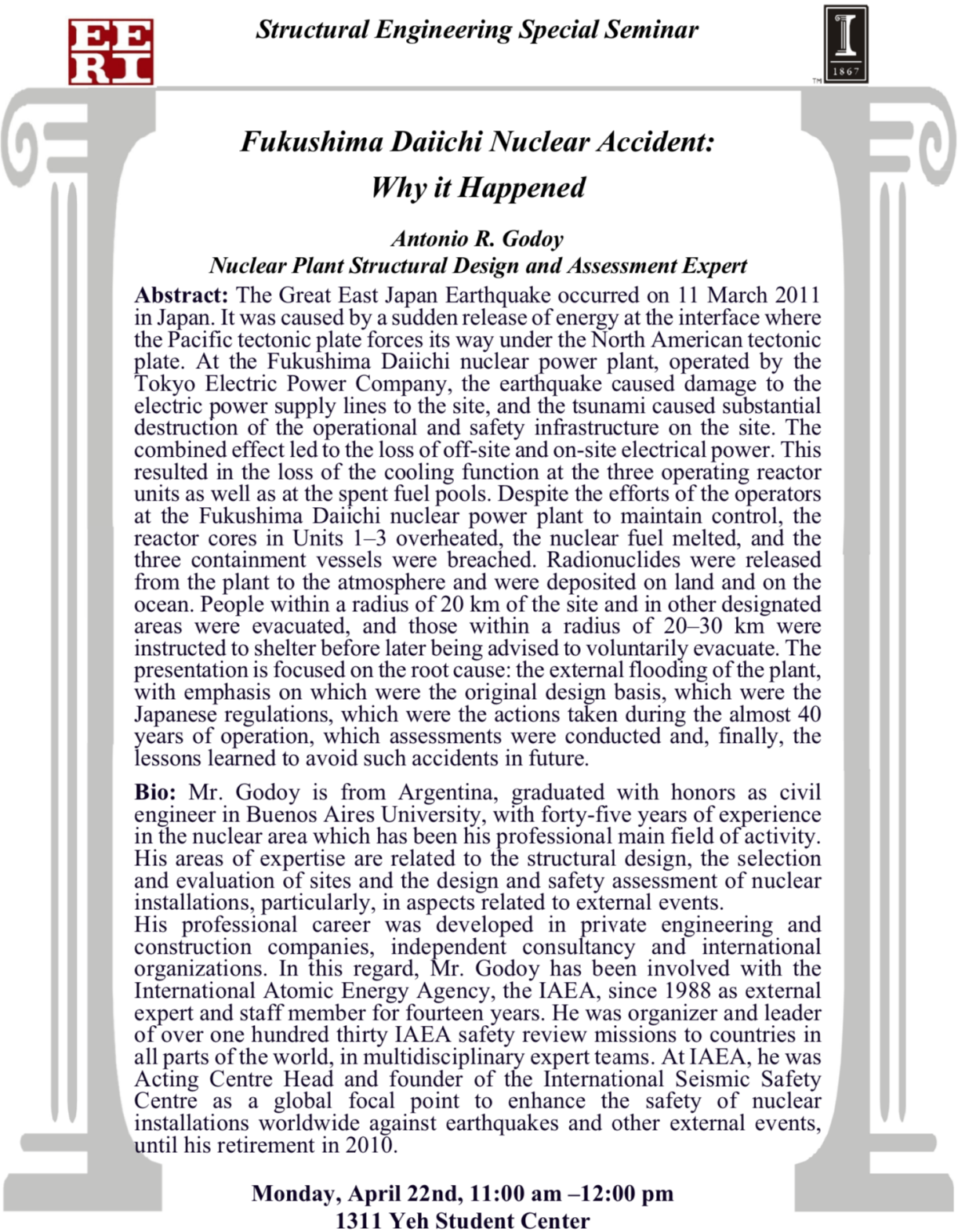
Dr. Annie Kammerer
Owner, Annie Kammerer Consulting

Abstract: Since the beginning of the nuclear power industry, the framework and methods used in the seismic design and risk evaluation of the fleet of nuclear power plants in the US has gone through significant change and advancement. This presentation—targeted to the technically-inclined layperson—will cover a wide variety of topics including: basic nuclear plant design concepts (how they work and what can go wrong), why the engineering of nuclear plants is unique and challenging, brief history of seismic regulations, design approaches, and reevaluation efforts, the performance-based and risk-informed methods used in the industry today, the impact of the Fukushima Daiichi accident, including current and future NRC efforts, the NRC, IAEA, and the new global nuclear picture.

Bio: Dr. Annie Kammerer is owner of Annie Kammerer Consulting, a firm specializing in seismic hazard and risk consulting for the nuclear energy sector. She is also the executive director of the Consortium of Organizations of Strong Motion Observation Systems (COSMOS), an applied research organization out of at UC Berkeley. Her work is principally focused on analysis and regulatory processes associated with probabilistic seismic and tsunami hazard and risk assessments for nuclear plants and other critical facilities. Prior to starting her own firm, she was Principal Seismologist for the Bechtel Corporation in San Francisco. Prior to that, she spent 7 years at the US Nuclear Regulatory Commission, where she coordinated the NRC Seismic Research Program. At the NRC, she developed the current US guidance on performing seismic hazard assessments and seismic margin analysis for nuclear facilities. Starting in 2011, Dr. Kammerer was a member of the NRC's seismic technical team developing post-Fukushima response and re-evaluation guidance. From 2012 to 2013, she was also the NRC's technical lead for a special program conducting Seismic Walkdowns of all 104 operating US nuclear plants in response to the Fukushima Daiichi accident. Dr. Kammerer is active internationally and has chaired IAEA Working Groups on seismic re-evaluation of operating reactors, tsunami, and seismic isolation. She holds three degrees from UC Berkeley, including a PhD in geotechnical engineering with minors in strong motion seismology and structural engineering.

Monday, April 22nd, 4:00-5:00pm
1310 Yeh Student Center

Item 1. Flier for Dr. Kammerer seminar



Structural Engineering Special Seminar

Fukushima Daiichi Nuclear Accident: Why it Happened

Antonio R. Godoy
Nuclear Plant Structural Design and Assessment Expert

Abstract: The Great East Japan Earthquake occurred on 11 March 2011 in Japan. It was caused by a sudden release of energy at the interface where the Pacific tectonic plate forces its way under the North American tectonic plate. At the Fukushima Daiichi nuclear power plant, operated by the Tokyo Electric Power Company, the earthquake caused damage to the electric power supply lines to the site, and the tsunami caused substantial destruction of the operational and safety infrastructure on the site. The combined effect led to the loss of off-site and on-site electrical power. This resulted in the loss of the cooling function at the three operating reactor units as well as at the spent fuel pools. Despite the efforts of the operators at the Fukushima Daiichi nuclear power plant to maintain control, the reactor cores in Units 1–3 overheated, the nuclear fuel melted, and the three containment vessels were breached. Radionuclides were released from the plant to the atmosphere and were deposited on land and on the ocean. People within a radius of 20 km of the site and in other designated areas were evacuated, and those within a radius of 20–30 km were instructed to shelter before later being advised to voluntarily evacuate. The presentation is focused on the root cause: the external flooding of the plant, with emphasis on which were the original design basis, which were the Japanese regulations, which were the actions taken during the almost 40 years of operation, which assessments were conducted and, finally, the lessons learned to avoid such accidents in future.

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Monday, April 22nd, 11:00 am –12:00 pm
1311 Yeh Student Center

Item 2. Flier for Mr. Godoy presentation

ILLINOIS
Civil & Environmental Engineering
COLLEGE OF ENGINEERING

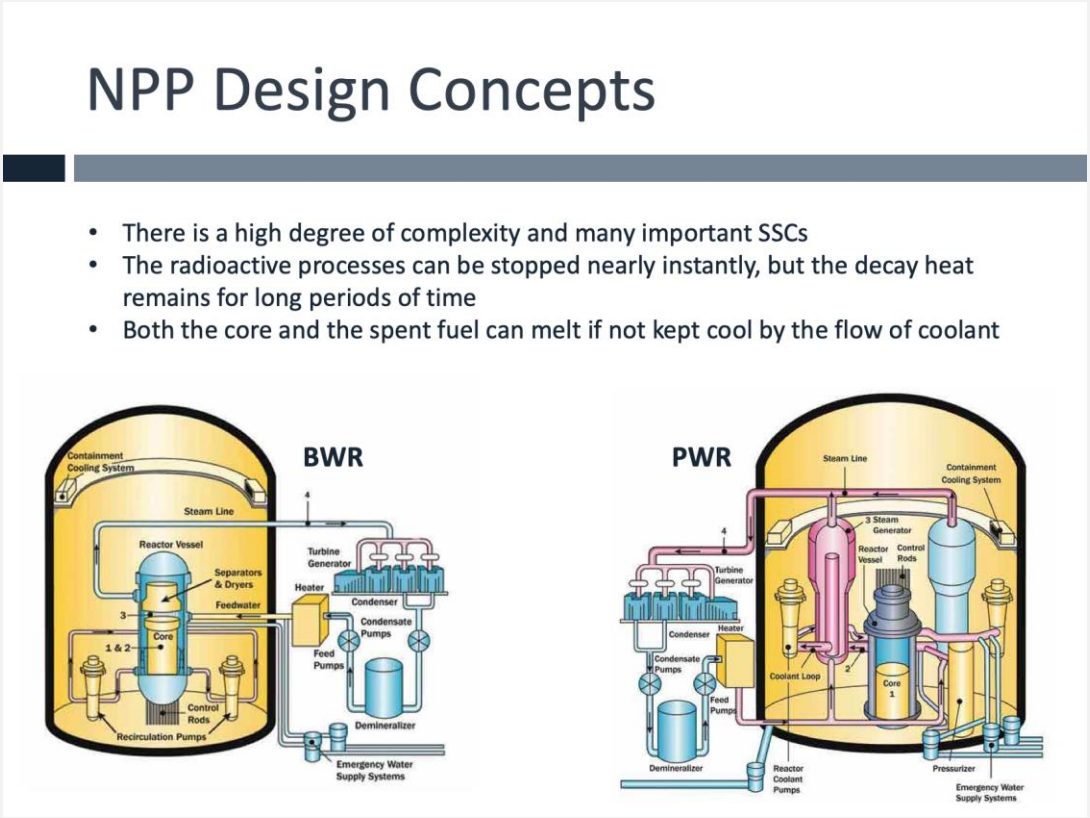
Dr. Annie Kammerer
Owner, Annie Kammerer Consulting

Antonio Godoy
Nuclear Plant Structural Design and Assessment Expert

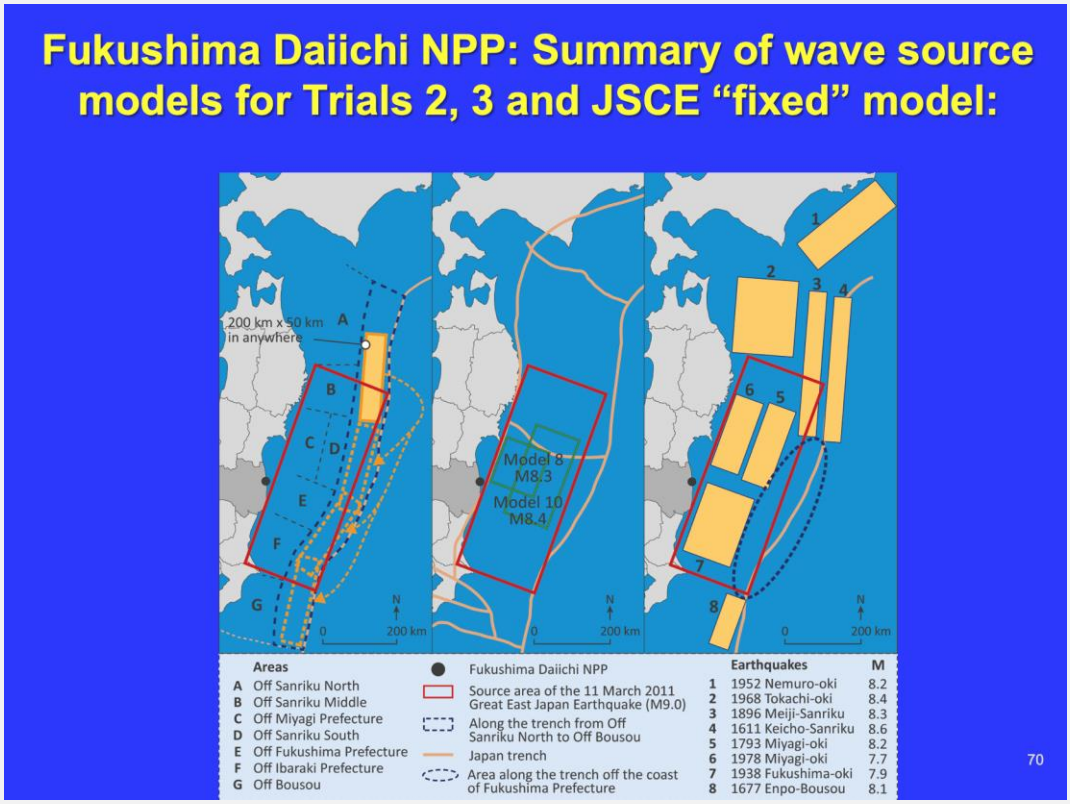
Monday, April 22, 2019

8:45 a.m.	Xulai Xu will pick up in the Hyatt Lobby
9:00 a.m.	Breakfast with EERI Student Chapter, *2312 Newmark Lab*
9:30 a.m.	Meeting with Prof. Jinhui Yan, *2106 Newmark Lab*
10:00 a.m.	Lab Tour
10:30 a.m.	Meeting with Prof. Frank Lombardo, *3110 Newmark Lab*
11:00 a.m.	Antonio Godoy's Presentation, *1311 Newmark Lab*
12:15 p.m.	Lunch at *Panera* with EERI Student Chapter *(T-card information under "Civil Engineering")*
1:30 p.m.	Meeting with Prof. Youssef Hashash, *2230E Newmark Lab*
2:00 p.m.	Meeting with Prof. Bassem Andrawes, *3122 Newmark Lab*
2:30 p.m.	Meeting with Prof. Eun Cha, *2207 Newmark Lab*
3:00 p.m.	Meeting with Prof. Ahmed Elbanna, *2219 Newmark Lab*
3:30 – 3:50 p.m.	BREAK/Seminar Preparation
4:00 – 5:00 p.m.	Structural Engineering Seminar *1310 Newmark*
3:50 – 4:00 p.m.	Setup
4:00 – 4:45 p.m.	Lecture
4:45 – 5:00 p.m.	Q&A
6:30 p.m.	Dinner at *Destihl* with Prof. Ahmed Elbanna, Kevin Chen, Karl Eid and Michael Neal *(Reservation for 6 under "Kammerer")*

Item 3. Initial itinerary sent to Dr. Kammerer, Mr. Godoy, professors, and board members of the chapter



Item 4. Sample slide of the presentation used at Dr. Kammerer seminar



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