UNIVERSITÀ DEGLI STUDI DI PALERMO

dipartimento di ingegneria unipa

Prof. Lidia La Mendola
Tel +3909123896743
Mail: lidia.lamendola@unipa.it

AVVISO DI SEMINARI

Si comunica che in data Mercoledì 19 Giugno alle ore 10.30 presso l'Aula Conferene dell'ex DICAM il Prof. Robert B. Fleishman del Department of Civil and Architectural Engineering & Mechanics dell'Università dell'Arizona terrà due seminari dai titoli:

PERFORMANCE OF CONCRETE STRUCTURES IN THE 2010-11 NEW ZEALAND, CHILE AND JAPAN EARTHQUAKES

DEVELOPMENT AND SHAKE TABLE TESTING OF AN INERTIAL FORCE-LIMITING FLOOR ANCHORAGE SYSTEM FOR LOW DAMAGE SEISMIC BUILDING STRUCTURES

Docenti, dottorandi e studenti sono invitati a partecipare.

Prof. Lidia La Mendola

COURSES SUMMARY:

Performance of concrete structures in the 2010-11 New Zealand, Chile and Japan earthquakes: Concrete construction was the dominant construction form in New Zealand the past half-century. In particular, precast concrete construction is widely used in New Zealand for an assortment of structures including office buildings, parking structures, bridges, stadiums, and marine structures. Many of these structures were designed for seismic performance based on code developments in New Zealand in these last quarter of the 20th century. The strong earthquake that hit New Zealand's second largest city. Christchurch on February 22, 2011 provided a unique opportunity to study the performance of precast concrete structures and learn valuable lessons on details and practices that provide good performance and those require improvement.

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This presentation provides observations from a post-earthquake reconnaissance team sent by the Prestressed/Precast Concrete Institute (PCI) to Cristhchurch New Zealand in the month following the earthquake. Structural performance varied from undamaged, to repairable damage, and isolated cases of collapse. The structures evaluated included precast moment frame high rise office buildings, precast shear wall apartment building structures are compared to the performance of cast in situ concrete structures in the New Zealand Earthquakes. Precast structural components included floor elements, cladding and staircases, which all find widespread use. Staircases in a some high rise buildings collapsed. Precast bridges, industrial buildings, stadiums, piers and wharfs performed well. Precast structures with special seismic systems (PRESSS hybrid frames, rocking walls, base isolated structures), including critical care facilities, performed extremely well under strong shaking, with little or no damage and full operational capabilities immediately after the event. Likewise, strong earthquakes struck Chile and Japan in 2010-2011 and the performance of precast concrete structures in these earthquakes are also discussed.

Development and shake table testing of an inertial force-limiting floor anchorage system for low damage seismic building structures: A new floor connecting system is being developed for low-damage seismic-resistant buildings structures. The system, termed an Inertial Force-Limiting Floor Anchorage System (IFAS) is intended to limit the seismic forces in buildings during an earthquake. This objective is accomplished by providing low-strength deformable connections between the floor system and the primary elements of the lateral force resisting system. The connections transform the seismic demands from inertial forces to relative displacements on the floor, thereby dissipating the eathquake energy. This talk describes the development of the IFAS via a multi-university National Science Foundation (NSF) Network for Earthquake Engineering Simulation Research (NEESR) Project involving the University of Arizona, Lehigh University and University of California-San Diego. The project involved extensive analytical research to optimize the IFAS design properties, leading to the development of an IFAS prototype using state-of-the-art components. The project culminated with IFAS performance being demonstrated in a shake table testing program that provided a direct comparison with an equivalent traditional “rigidly-anchored floor” structure. The test structure was a half-scale four-story reinforced concrete flat plate shear wall structure. Precast hybrid rocking walls and special precast columns were used for the test repeatibilty for a 22 strong motion sequence. The structure was purposely provided with an eccentric wall layout to examine the performance of the system in coupled translational-torsional response.

The test results indicate a seismic demand reduction in the IFAS structure relative to the traditional structure, including lower shear wall base rotation, shear wall and structure inter-story drift, and accelerations. These results indicate the potential for the IFAS to minimize structural and non-structural damage during earthquakes.

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Dr. Robert B. Fleishman

Prof. Civil Engineering. Dept. Civil and Architectural Engineering & Mechanics,
University of Arizona Tucson, United States.

Dr. Robert B. Fleishman is a Professor in the Department of Civil and Architectural Engineering & Mechanics at the University of Arizona (UA). He formerly held the Delbert R. Lewis Associate Professorship at UA. Dr. Fleishman received his B.S. from Carnegie-Mellon University and his M.S. and Ph.D. from Lehigh University. Dr. Fleishman has industry experience at Turner Construction (New York, NY), Thornton-Tomasetti/C-B-M (Chicago, IL) and Rutherford & Chekene (San Francisco, CA), and is a member of several national committees. Dr. Fleishman's research area is seismic resistant design of precast/prestressed concrete and steel structures with recent focus on the development of new low-damage seismic-resistant building systems and floor diaphragms and collectors. He has served as Principal Investigator (PI) on over $5M of external funded research, and has 80+ journal publications/conference papers. His research has integrated computational simulation with physical experiments, including over 30 large-scale structural tests and three large-scale shake table tests. The findings of one project, the development of a new design methodology for precast concrete floor diaphragms, has been included in the ASCE 7-16 Load Standards and Part 3 of the 2015 National Earthquake Hazards Reduction Program (NEHRP) Recommended Provisions for Seismic Design for New Buildings. Dr. Fleishman has won several national awards for his research on precast floor systems including the 2016 American Society of Civil Engineers (ASCE) Charles Pankow Award for Innovation, the National Science Foundation (NSF) 2014 NEES Outstanding Contributor Award of Merit, the 2009 and 2004 Martin P. Korn Awards, the 2006 Charles C. Zollman Award, and 2004 George D. Nasser Award. Dr. Fleishman has led earthquake reconnaissance teams to Haiti and New Zealand, and was recently named a 2018-19 U.S. Fulbright Global Scholar. Dr. Fleishman has also won teaching awards at the University of Arizona eight times in the past decade.