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INGEGNERIA SISMICA
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ASDEA SOFTWARE

Seminario Online
21 Luglio 2023
ore 15:45

Zoom Link: https://us02web.zoom.us/j/84721570749
Open to 100 Participants.
If you do not arrive in time to get a spot, you can follow the seminar live on YouTube:
https://youtube.com/live/rsClvY81hMc?feature=share

Ore 16:00
Prof. Joel P. Conte,
University of California, San Diego, USA
NHERI@UC San Diego Upgraded 6-DOF Large High-Performance Outdoor Shake Tabl

Ore 16:45
Prof. Shiling Pei
Colorado School of Mines
NHERI TallWood Project: Seismically Resilient Tall Wood Building

Speaker:
Joel Conte, Ph.D., P.E., F. EMI
Professor
Department of Structural Engineering
University of California, San Diego, USA

Presentation Title:
"NHERI@UC San Diego Upgraded 6-DOF Large High-Performance Outdoor Shake Table"

Bio-Sketch

Joel Conte is Distinguished Professor of Structural Engineering at the University of California, San Diego, where he currently holds the Eric and Johanna Reissner Chair in Applied Mechanics and Structural Engineering at the Jacobs School of Engineering. His primary research interests are in structural modeling & analysis, structural dynamics and earthquake engineering, random vibrations, structural reliability and risk analysis, probabilistic performance-based analysis & design of structures, shake table dynamics and control, experimental-analytical correlation studies, structural identification and health monitoring.

Dr. Conte was a member of the design team for the Large High-Performance Outdoor Shake Table (LHPOST) facility at UC San Diego, which was developed as part of the NSF George E. Brown Network for Earthquake Engineering Simulation (NEES), was Principal Investigator of the NSF funded project to upgrade the LHPOST to six degrees of freedom (in 2018-2022), and is currently Director of the UC San Diego Englekirk Structural Engineering Center which includes the NSF Natural Hazard Engineering Research Infrastructure (NHERI) LHPOST6 shake table experimental facility.

Abstract

Since its commissioning in 2004, the UC San Diego Large High-Performance Outdoor Shake Table (LHPOST) has enabled the seismic testing of large structural, geostructural and soil-foundation-structural systems, with its ability to accurately reproduce far- and near-field ground motions. In its 15 years of operation (2004-2019) as a 1-DOF shake table, 34 landmark projects were conducted on the LHPOST as a national shared-use NEES and then NHERI experimental facility funded by the US National Science Foundation.

The tallest structures ever tested worldwide on a shake table were tested using the LHPOST/LHPOST6, which has no roof overhead and is, therefore, free from height and crane capacity restrictions. Experiments conducted on the LHPOST have generated essential knowledge that has greatly advanced seismic design practice and response predictive capabilities for structural, geostructural, and nonstructural systems. However, the limitation of the LHPOST to unidirectional (1-DOF) input motion prevented the investigation of important aspects of the actual seismic response of 3-D civil infrastructure systems to realistic multi-directional seismic input excitation. The LHPOST was originally designed as a 6-DOF shake table but built as a 1-DOF system to meet the funding available at the time. With a grant from the National Science Foundation (NSF) along with additional financial resources from UC San Diego, the LHPOST was recently (2019-2022) upgraded to its full 6-DOF capabilities and renamed the LHPOST6.

This presentation will provide an overview of the LHPOST under its initial 1-DOF capability and of past landmark projects. It will describe the upgrade to six degrees of freedom and the performance characteristics of the LHPOST6. New seismic research and testing opportunities offered by the LHPOST6 will be discussed.

Speaker:
Shiling Pei, PhD. P.E.
Associate Professor
Colorado School of Mines

Presentation Title:
"NHERI TallWood Project: Seismically Resilient Tall Wood Buildings"

Bio-Sketch. Dr. Shiling Pei received his Ph.D. in Civil Engineering from Colorado State University in December 2007 and joined the faculty of Civil and Environmental Engineering at Colorado School of Mines in Fall 2013. Before that, he worked as an Assistant Professor at South Dakota State University from 2010 to 2013. His research focused on multi-hazard mitigation through performance based engineering, numerical modeling of structural dynamic behavior, traditional and innovative timber systems, and large-scale dynamic testing. Dr. Pei received the 2012 ASCE Raymond C. Reese Research Prize for his work on seismic performance of mid-rise wood frame building. He is the author of the Seismic Analysis Package for Woodframe Structures (SAPWood) as part of the NSF (NEESR) funded NEESWood project, and served as one of the lead researchers in shake table testing of a full-scale 7-story wood-steel hybrid building at Japan's E-defense shake table. He is currently leading an NSF funded six-university collaboration effort to develop seismic design methodology for resilient tall cross laminated timber (CLT) buildings. Dr. Pei is a registered Professional Engineer in State of California.

Summary. Wood has thousands of years of history as a building material but has also been restricted by building codes and regulations following the industrial revolution. Wood building is viewed as a cost-effective, but less engineered system mainly for low-rise options. Mass timber construction is a relatively new way of utilizing wood material for modern, high performance buildings at both large and small scales. It gives rise to the currently trending conception of wooden sky-scrapers. The Natural Hazards Engineering Research Infrastructure (NHERI) TallWood project aims to prove the resilience of tall timber buildings by simulating a series of large earthquakes on a full-scale, 10-story mass timber building. This is the world's tallest full-scale building ever tested on an earthquake shake table. The key feature of the building is a post-tensioned rocking wall system built from mass timber panels. The building also features a variety of nonstructural systems, including four exterior façade assemblies, a number of interior walls, and a 10-story stair tower. The structural and non-structural systems of the building were designed to withstand repetitive large earthquakes without damage. The first phase of the test program just concluded in May 2023 and the results demonstrated that it is feasible to construct tall wood buildings that are earthquake resilient. This presentation will introduce the design, construction, and testing of the NHERI TallWood building and share preliminary test results.

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