牆設計與性能國際研討會

「勘災案例、研究證據、及實務設計」

The International Conference on Performance and Design of Walls: Past observations, research evidences, and practical implications

Date：2024年8月5日(一)09:00-16:00

Venue：國家地震工程研究中心(NCREE)Room 101

主辦單位：國立臺灣科技大學臺灣建築科技中心(TBTC)、營建工程系
協辦單位：國家地震工程研究中心(NCREE)

Speakers

Santiago Pujol
Professor of University of Canterbury

Shyh-Jiann Hwang
Professor of National Taiwan University

Jeff Dragovich
DeSimone Consulting Engineering

Agenda

09:00-09:10 Opening Remarks by Director S.S. Chen, TBTC of NTUST & by Director Y.C. Ou, NCREE

09:10-10:30 The Simplest Way to Achieve Resilience by Prof. Santiago Pujol

10:50-12:10 Modeling and Retrofitting of Brick Infills of RC Frame Buildings by Prof. S.J. Hwang

13:30-16:20 Seismic Design and Performance Assessment of a Special Reinforced Concrete Shear Wall Structural System by Dr. Jeff Dragovich（14:50-15:10 Break）

Contact

02-27376295　吳孟娟
m.chuan1982@mail.ntust.edu.tw
國立臺灣科技大學臺灣建築科技中心

Registration Link 報名連結

https://forms.gle/doaiGvRjQ8JkCW679

The Simplest Way to Achieve Resilience

Abstract:
The presentation shows evidence indicating that a building proportioned following the Californian tradition to have a period close to N/10 (N being number of stories) is quite unlikely to do well in an intense earthquake (with PGV exceeding 100 cm/s). Its survival would depend on the use of flawless structural details and its 'reusability' would likely require extensive repairs. In contrast, a building proportioned to have a period close to N/20, as in the case of Chilean tradition, is likely to have less structural and non-structural damage in a similar intense earthquake. Given that we keep getting surprised by the intensities of the motions that we record as our recording networks expand, and given the apparent costs related to increases in robustness and building repair (not to mention disruptions of entire neighborhoods), this talk proposes that the Chilean tradition is preferable over the Californian tradition for proportioning buildings in highly seismic areas. The simplest way to achieve that level of robustness is to use structural reinforced concrete walls. Their use, nevertheless, should not come at the expense of detailing. Examples of details that have been revised over the last decade are presented to emphasize the idea that we need to include a margin of safety against excessive drift in the design process.

Dr. Pujol is Professor of Civil Engineering at the University of Canterbury. Prior to moving to New Zealand, he was Professor of Civil Engineering at the Lyles School of Civil Engineering, Purdue University. His experience includes: earthquake engineering, evaluation and strengthening of existing structures, response of reinforced concrete to impulsive loads and earthquake demands, instrumentation and testing of structures, and failure investigations. He is a Fellow of the American Concrete Institute (ACI), Chair of ACI committee 133 (Disaster Reconnaissance), and member of ACI committees 445 (Torsion and Shear), 314 (Simplified Design), and 318R (High-Strength Reinforcement). He is also member of the Earthquake Engineering Research Institute (EERI), associate editor of Earthquake Spectra, and founder of datacenterhub.org (a site funded by the U.S. National Science Foundation and dedicated to the systematic collection of research data). He received the Chester Paul Siess Award for Excellence in Structural Research from ACI, the Educational Award from Architectural Institute of Japan, and the Walter L. Huber Civil Engineering Research Prize from ASCE. Professor Pujol holds both his M.S. and Ph.D degrees from the Department of Civil Engineering at Purdue University. His earthquake resonance works include Colombia (1999), Mexico (1999), Turkey (2000), Japan (2007, 2008, 2011), Peru (2007), China (2008), Haiti (2010), Chile (2010), and Nepal (2015), Taiwan (2016), Mexico (2017), and Turkey (2023).

Modeling and Retrofitting of Brick Infills of RC Frame Buildings

Abstract:
A large number of low-rise buildings consisting of RC frames with brick infill were constructed in Taiwan between the 1970s and 1990s, such as school buildings and street houses. At that time, Taiwan's seismic design standards were not yet mature, so the seismic design requirements for these low-rise buildings were relatively low, and ductile reinforcement detailing was not installed in RC frame, resulting in limited seismic capacity. Therefore, it is necessary to promptly conduct seismic assessment and retrofitting to enhance their seismic resistance. Modeling the seismic behaviors of brick infill walls can significantly impact the assessment of seismic resistance and retrofitting efforts for these low-rise buildings. Due to functional requirements, brick infills often have openings for doors and windows, which can drastically reduce their strength. Implementing simple seismic retrofitting measures to enhance their seismic strength can greatly improve the seismic resistance of low-rise buildings. This study provides specific recommendations for modeling and retrofitting the seismic capacity of RC frames with brick infill based on force transfer mechanisms and experimental findings.

Dr. Hwang is Professor of Civil Engineering at the National Taiwan University, Taipei, Taiwan. He had served as the Director General of National Center for Research on Earthquake Engineering (NCREE) in Taiwan. He received his Master and PhD form the University of California, Berkeley. Dr. Hwang has been awarded the Distinguished Chair Professor of National Taiwan University. He serves as a member of seismic code committee in Taiwan and is very active in Taiwan concrete society. His research interests include shear behavior of reinforced concrete members, and seismic design and retrofitting of reinforced concrete structures. He had been responsible for providing technical supports to a national project that evaluates and retrofits all the non-code compliant school buildings in Taiwan. He is now participating the seismic retrofitting project of weak story issued by the Ministry of Interior Affairs. This project is aimed to remove the seismic deficiency of the soft first story as a first priority for the residential buildings.

Seismic Design and Performance Assessment of a Special Reinforced Concrete Shear Wall Structural System

Abstract:
The seismic design and performance-based assessment of a 42-Story building is presented. The lateral system for the building consists of a core-wall only with a concrete flat-plate and column gravity system supported on a mat foundation. The presentation has two main parts: (a) seismic analysis and design based on the requirements ASCE 7-22 and ACI 318-19, and (b) a Performance Based Seismic Design assessment utilizing the Los Angeles Tall Building Seismic Design Council (LATBSDC) 2023 edition of "An Alternative Procedure for Seismic Analysis and Design of Tall Buildings." The presentation will also highlight updated seismic design requirements in the draft ACI 318-25. The analysis and design example covers seismic hazard considerations, structural modeling requirements, loads development, lateral system design and detailing. A description and application of the performance evaluation in the LATBSDC procedure is also presented.

Dr. Dragovich leads the Research and Development group at DeSimone Consulting Engineering, NY, USA. His professional experience includes seismic design of reinforced concrete structures, performance-based wind and seismic design, nonlinear analysis and software development. He worked as a research structural engineer in the National Earthquake Hazards Reduction Program at the National Institute of Standards and Technology. Dr. Dragovich earned his BS in civil engineering from Seattle University and his MS and PhD in civil engineering from the University of Illinois at Urbana-Champaign. He is a licensed civil and structural engineer in California and Washington and is a Fellow of the American Concrete Institute. He is a member of ACI Committees 131 (Building Information Modeling), 318-H (Seismic Provisions), 369 (Seismic Repair and Rehabilitation), 374 (Performance-Based Seismic Design), 375 (Performance-Based Wind Design, and a member of ASCE 41 (Seismic Evaluation and Retrofit of Existing Buildings).