NARLabs 國家實驗研究院

國家地震工程研究中心

National Center for Research on Earthquake Engineering

# <u>演講公告</u>

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**講題：**

Factors Influencing the Lateral Drift Capacity of Structural Walls

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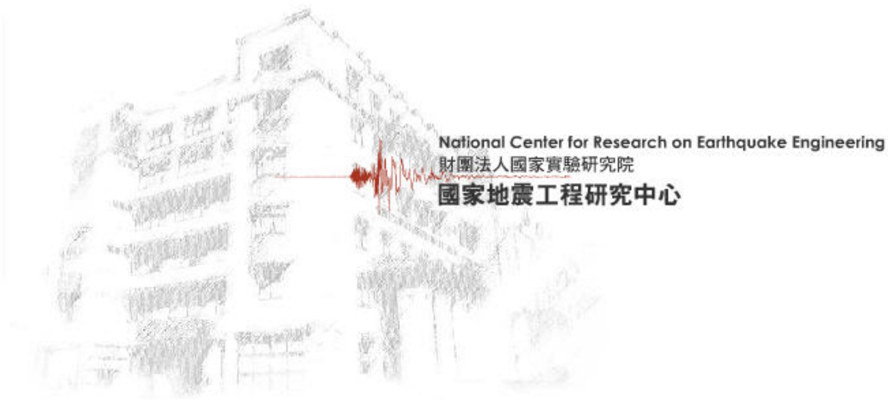
國家地震工程研究中心 1 樓 101 演講廳



# Factors Influencing the Lateral Drift Capacity of Structural Walls

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Earthquakes and laboratory tests since 2010 have demonstrated that thin, slender walls may not possess the deformation levels allowed in modern codes and standards. Results from recent wall panel tests conducted at UCLA indicate that, depending wall geometry and detailing, the lateral drift capacity well-detailed walls can vary by a factor of two. Based on these tests and a small database of approximately 30 slender walls, a lateral drift capacity prediction equation was developed in a displacement-based design format and used to identify key parameters impacting lateral drift capacity. It is demonstrated that, in addition to provided boundary transverse reinforcement, drift capacity of slender walls is most impacted by compression depth ($c$), wall thickness ($b$), and wall length ($l_w$). Given that ACI 318-14 and other international codes do not consider all of these factors, equivalent performance is not expected for all walls that satisfy detailing requirements required by modern codes. Lower drift capacities are noted for walls with neutral axis depths that exceed two to three times the wall thickness, walls with slender cross sections ($l_w/b > 15$) and walls design with high shear demand; such characteristics are common for walls in modern buildings in the US. The results indicate that slender walls may fail prior to achieving the drift demand determined from ASCE 7 analysis approaches (including NL-RHA). Subsequently, a comprehensive database was created with results from more than 160 ACI 318 compliant wall tests to develop a robust expression to predict wall lateral drift capacities. Based on estimates of lateral drift capacities (from the database) and drift demands (from analysis), a simple design check is proposed to require that drift demand be compared with drift capacity to verify that a given wall can achieve the estimated drift demand with a prescribed reliability. The developed displacement-based model provides key data to understand parameters that impact wall drift capacity, and the new design approach provides a rational framework for design of buildings that utilize structural walls as a lateral-force-resisting systems.

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John Wallace is professor of civil engineering at University of California, Los Angeles, California (UCLA). His research interests include analysis and design of buildings and bridges subjected to earthquake actions, laboratory and field testing of structural components and systems, and application of sensors and sensor networks for seismic structural health monitoring. He served as PI on the UCLA NEES Equipment Site for *Field Testing and Monitoring of Performance of Geotechnical and Structural Systems* and he has secured more than $20M in research funding since 1989. Dr. Wallace has published more than 75 peer-reviewed journal and more than 100 conference articles, with four papers recognized as Outstanding Journal papers. Professor Wallace has been active as a consultant on seismic rehabilitation projects in California and has served as an external reviewer on a number of high-rise building projects in California utilizing performance-based seismic design. He is a Fellow of the American Concrete Institute and of the American Society of Civil Engineers, a voting member of ACI Committee 318, and past President of the Los Angeles Tall Buildings Council. He received in PhD in Civil Engineering from the University of California, Berkeley in 1989.