Department of Structural Engineering
University of California, San Diego
SE 290 Seminar

Professor P. Benson Shing
Structural Engineering
University of California, San Diego

"Assessment of Seismic Performance of Low-rise Reinforced Masonry Buildings"
Wednesday, January 16, 2019
1:00 pm - 1:50 pm, Cognitive Science Building, Room 001

https://structures.ucsd.edu/seminars

Abstract

For regions of high seismic hazards (Seismic Design Category D or above), reinforced masonry shear walls must have design details that meet the special wall requirements of the masonry design standard TMS 402. Walls so designed are intended to behave in a ductile manner characterized by flexure-dominated behavior, and can assume a seismic response modification factor (R) of 5 according to ASCE/SEI 7. However, in spite of the shear capacity design requirement in TMS 402, these wall systems could still develop shear-dominated behavior if the wall elements have low shear-span ratios, which is likely for low-rise wall systems. Experimental data from quasi-static wall segment tests have shown that shear-dominated walls behave in a brittle manner and may not meet the performance anticipated in the code. Furthermore, past numerical studies showed that low-rise reinforced masonry buildings, as well as those of other materials, designed according to current codes could have a probability of collapse higher than the intended target regardless of the governing failure mechanism. This is inconsistent with observations in past earthquake events showing good performance of reinforced masonry buildings, most of which were low-rise. This presentation summarizes recent studies performed by the presenter's research group to find an explanation of this inconsistency. In the studies, refined finite element models were developed to simulate the seismic response of reinforced masonry buildings in a detailed manner with an ability to capture both flexure- and shear-dominated behaviors. This talk will present the computational models, numerical results, and supporting experimental evidence from large-scale shake-table tests.

Biography

P. Benson Shing earned his BS, MS, and Ph.D. degrees from the University of California at Berkeley. His current research focuses on understanding and improving the performance of concrete and masonry structures in extreme earthquake events. The studies presented here were supported by FEMA through the Applied Technology Council, and by NIST and NSF.

Sponsored by Professor Ken Loh
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