

Title Seismic Fragility Analysis of High Rise Structures

Year 2013

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Abstract

“Consequence-Based Engineering (CBE)” is an emerging field for the execution of risk management, as it can deliver an insight into the seismic performance of civil engineering infrastructures. Fragility analysis is one of the components of CBE and it can be employed for pre-earthquake planning as well as for the loss estimations after the earthquake occurrence. In this particular study, a new methodology is proposed for fragility assessment of High-Rise structure, considering their higher mode effects. For this purpose a case study is conducted by considering a 55 story high-rise building, located in Manila, Philippines. Static POA and cyclic POA are conducted in the weaker direction of the considered structure, and quantitative limit states of the structure are defined on the bases of results obtained from static POA of first four modes. The current study considers the variations in the materials’ strengths as well as in the seismic demand. 15 ground motions are used and scaled at various intensity levels to generate an appropriate and adequate range in structural response. UMRHA procedure is employed by making SDOF systems of the actual structure for first four modes, and finally depending upon the results obtained from UMRHA, the fragility curves are developed along with the direct sampling probabilities corresponding to two particular limit states of the considered structure.

Keywords Consequence-Based Engineering; Cyclic Pushover Analysis; Intensity Measures; Damage Measures; UMRHA; Fragility Analysis