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Effect of Different Ground Motion Scaling Methods on Behavior of 40 Story RC Core Wall Building

Authors : Muhammad Usman, Munir Ahmed

Abstract : The demand of high-rise buildings has grown fast during the past decades. The design of these buildings by using RC core wall have been widespread nowadays in many countries. The RC core wall (RCCW) buildings encompasses central core wall and boundary columns joined through post tension slab at different floor levels. The core wall often provides greater stiffness as compared to the collective stiffness of the boundary columns. Hence, the core wall dominantly resists lateral loading i.e. wind or earthquake load. Non-linear response history analysis (NLRHA) procedure is the finest seismic design procedure of the times for designing high-rise buildings. The modern design tools for nonlinear response history analysis and performance based design has provided more confidence to design these structures for high-rise buildings. NLRHA requires selection and scaling of ground motions to match design spectrum for site specific conditions. Designers use several techniques for scaling ground motion records (time series). Time domain and frequency domain scaling are most commonly used which comprises their own benefits and drawbacks. Due to lengthy process of NLRHA, application of only one technique is conceivable. To the best of author's knowledge, no consensus on the best procedures for the selection and scaling of the ground motions is available in literature. This research aims to provide the finest ground motion scaling technique specifically for designing 40 story high-rise RCCW buildings. Seismic response of 40 story RCCW building is checked by applying both the frequency domain and time domain scaling. Variable sites are selected in three critical seismic zones of Pakistan. The results indicates that there is extensive variation in seismic response of building for these scaling. There is still a need to build a consensus on the subjected research by investigating variable sites and buildings heights.

Keywords : 40-storied RC core wall building, nonlinear response history analysis, ground motions, time domain scaling, frequency domain scaling
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