



Characteristics of Strong Ground Motions for Delhi National Capital Region (NCR) Using Small to Moderate Size Earthquakes

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Abstract

The characteristics of strong ground motions such as spectral acceleration and their behaviour on the structural design code are rigorously studied using small to moderate earthquakes occurred in the Delhi NCR region and recorded at local seismic network installed by IIT, Roorkee under the sponsorship of the Ministry of Earth Sciences. Seven earthquakes with magnitude range 3.3 to 4.9 occurred at depths of 5 to 22 km have been used in the present study. Total 159 earthquake waveforms from 27 seismic stations are processed for this purpose. The observed peak ground acceleration (PGA) associated with 5th March 2012 (M 4.9) lies in range of 2.4 to 30.8 cm/sec² and the peak ground velocity (PGV) lies in between 0.07 to 0.88 cm/sec. The maximum PGA (30.8 cm/sec²) is observed at Jaffarpur station and minimum PGA (2.6 cm/sec²) is observed at ridge observatory of New Delhi. The maximum horizontal spectral amplification occurred at 0.054 s in Holocene age formation, 0.109 s in Pleistocene age formation and 0.068 s in Proterozoic age formation. The maximum vertical spectral amplification is at 0.045 s in Holocene age formation, 0.084 s in Pleistocene age formation and 0.060 s in Proterozoic age formation. The normalized acceleration response spectra for Holocene, middle to late Pleistocene and Proterozoic age group is overestimated when compared with that of the Bureau of Indian standard code particularly in short period range whereas it is underestimated for the longer periods associated with the available data. The present analysis is beneficial for the seismic hazard studies in the Delhi NCR and may be utilized to improve the design code by characterizing the strong motion scenarios in the region.

Keywords: Strong ground motion, Amplification, Normalized response spectra