17th Symposium on Earthquake Engineering
November 14-17, 2022
IIT Roorkee, India
Paper No. 429

Modelling of Empirical Accelerograms of 1999 Chamoli Earthquake (Himalaya) Using a Modified Hybrid Approach

Anjali Sharma[1,3], Dinesh Kumar[1], Ajay Paul[2]

[1]Dept. of Geophysics, Kurukshetra University, Kurukshetra
[2]Wadia Institute of Himalayan Geology, Dehradun
[3]Ministry of Earth Sciences, Borehole Geophysics Research Laboratory, Karad, 415105, India

Abstract

In the present study, the empirical accelerograms of the 1999 Chamoli earthquake (M_s 6.6) have been modelled using a modified hybrid approach. The earthquake occurred in the Central Seismic Region of the Himalayan region and was recorded at the seismic network installed and maintained by the Department of Earthquake Engineering, IIT – Roorkee. The modified hybrid technique (Yadav, 2019) has been used to model the empirical accelerograms of the 1999 Chamoli earthquake at 9 recording sites. The epicentral distance of various observing stations lies in a range of 10 – 110 km. The empirical accelerograms of the earthquakes are available at the sampling rate of 50 Hz. The hybrid technique includes the generation of envelope functions by summing the envelope functions of the randomly distributed subevents on the fault plane. In the present modified hybrid technique, the site response high-frequency decay parameter i.e., kappa factor (κ) has also been evaluated and incorporated in to the existing technique. The site response functions have been estimated using the HVSR technique. The high-frequency decay parameter 'κ 'has been estimated to be in the range of 0.04 – 0.07. The simulated accelerograms have been compared with those of recorded ones in terms of Peak Ground Acceleration (PGA), duration, Response, and Fourier spectra. The modelled value of PGA is 347 cm/s^2 estimated at Gopeshwar is found to be close to the observed one (352 cm/s^2). The essential parameters of simulated accelerograms, including PGA values, duration, Response, and Fourier spectra, are well-matched with those of the recorded accelerograms for most sites.

Keywords: Seismic hazard, Simulation, Earthquake, Kappa, Site response function