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Stochastic Ground Motion Simulation with Site Correction in Ilan Area, Northeastern Taiwan

Megawati NFN (1) and Wen Kuo-Liang (1,2)

(1) Institute of Geophysics, National Central University, Taoyuan, Taiwan, (2) National Center for Research on Earthquake Engineering, Taipei, Taiwan

Earthquake waveform is controlled by three factors – source properties, path characteristics, and local site effects. The local site effect is the important factor participate strong ground motion prediction. In this study, we used stochastic point-source method for simulating ground motion (Boore, 2005). This method has been widely used in the development of ground-motion prediction equation and in modeling the parameters that controls observed ground motion (Atkinson et al., 2009).

The shallow earthquake events which recorded by Taiwan Strong Motion Instrumentation Program (TSMIP) from 1992 to 2012 are simulated with the stochastic point-source method (Boore, 1983; Boore, 2003). The earthquake records are selected with the depth from 0 to 30 km and the magnitude (Mw) from 4 to 6.5. The study area is situated in Ilan area which is located in the northeastern Taiwan. There are 70 TSMIP stations which based on the Vs30 consist of site class B, C, D, and E. Seismic parameters for stochastic method were selected based on previous studies (Sokolov et al., 2006; 2009). The crustal amplification parameter is set to the halfspace.

The empirical transfer functions from 0.2 Hz to 10 Hz for each station in Ilan area will be calculated by H/H method between observed and simulated spectra (Borcheret, 1970). Ground motion prediction is calculated by selecting several target events for stochastic point-source simulating to the halfspace. The prediction of peak ground acceleration (PGA) is estimated after doing the site correction with the empirical transfer function. Finally, the simulated ground motion was compared in time domain (PGA) and frequency domain (Degree of spectrum difference, DSPD) to show the goodness of the simulation.

Keywords : Stochastic point-source method, Site effect, Empirical transfer function