

Site amplification and strong ground motion simulation in the Seoul metropolitan area

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No major earthquakes have been recorded in the Seoul metropolitan area since 1978 when the national seismic monitoring began. However, seismic damage records in historical literatures suggest high seismic hazard potentials in the Seoul metropolitan area. Field observations of strong ground motions are not available for seismic design to large earthquakes in the region. Synthetic strong ground motions using site characteristics are often adopted for this purpose. The average shear wave velocity for the upper 30 m depth, V_{S30} , is an essential parameter to represent the site characteristics. We construct a V_{S30} model for the Korean Peninsula from the standard penetration test data that have been archived nationwide. We calculate synthetic strong ground motions and peak ground accelerations (PGA) in the Seoul metropolitan area using a stochastic ground motion prediction method. The stochastic ground motion prediction method calculates the spectral ground responses for given source, path, and site properties. The V_{S30} model is applied to represent the site properties of receiver sites. We find that a Mw5.4 earthquake with a focal depth of 7 km may develop PGAs of ~0.6 g, ~0.4 g, and ~0.1 g in Seoul at epicentral distances of 5 km, 10 km, and 15 km. The synthetic study suggests that a moderate-size earthquake may cause strong ground motions in Seoul. This approach may be useful for the assessment of possible strong ground motion levels by earthquakes in the Seoul metropolitan area.