

Strong ground motions in the Seoul metropolitan area by possible subsurface earthquakes

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The Seoul metropolitan area has a high population density. It is crucial to assess the possible levels of strong seismic ground motions for proper seismic design in the region. For accurate seismic design, it is necessary to understand site characteristics, fault structures, and ground motion properties. However, field observations of strong ground motions are not sufficient for seismic design. Synthetic strong ground motions are often used for this purpose. Various methods have been proposed for the synthesis of strong ground motions. We use a stochastic ground motion prediction method based on empirical Green's function to simulate the strong ground motions in the Seoul metropolitan area by fictitious moderate-size earthquakes at local subsurface faults. The stochastic ground motion prediction method calculates the spectral ground responses for given source, path, and site properties. Seismic wavetrains are determined using the empirical Green's functions that utilize the observed ground motion of micro or small earthquakes. The recently-developed V_{S30} model is used for receiver-site properties. We verify the method for strong ground motions of the 2016 Gyeongju earthquake and 2017 Pohang earthquake. We find that the synthetic ground motions reasonably agree with the observed ground motions. The synthetic approach may be useful for assessment of possible strong ground motion levels by earthquakes in the Seoul metropolitan area.