

Source modeling and strong ground motion simulation of the 2004 Mid Niigata prefecture earthquake, Part 2 Strong motion simulation

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We attempted strong ground motion simulation of the 2004 Mid Niigata Prefecture earthquake (MJMA=6.8) using the empirical Green's function method. Synthetic wave in horizontal components at NIG019 are extremely overestimated compared with the observed ones. In the NIG019, the effect of nonlinearity of the surface ground is pointed out from the existence of the extended predominant period appeared in acceleration recording.

Here, in order to investigate the reason of the overestimation in synthetics, we perform the preliminary nonlinear simulation at NIG019 based on the velocity structure by K-NET soil information and the spectral inversion results by Kawase and Matsuo(2004). The nonlinearity is modeled as follows. The skeleton curve of stress-strain is represented by the Ramberg-Osgood model, and the Masing rule is applied to the hysteretic characteristics relation. Because there were not site investigation results, the non-linear characteristic of the soil was estimated by an empirical relation.

First of all, the input motions on base-rock are calculated from the synthesized acceleration motions using Haskell's matrix method. Next, we synthesize the acceleration and velocity motions including the nonlinearity at the surface imposing the estimated input motions on base-rock.

As the results, the simulated ground motions fit acceptably the observed ones in both components. And the discrepancy between the synthetic pseudo velocity response spectra and the observed ones are improved by considering the nonlinearity of the sedimentary soils.