Strong-motion evaluation for scenario earthquakes in the Tonami Plain fault zone

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The National Research Institute for Earth Science and Disaster Prevention (NIED) has carried on the special research project 'National Seismic Hazard Mapping Project of Japan' to support the preparation of the seismic hazard map in general view of the whole Japan, which is made by the Headquarters for Earthquake Research Promotion.

We have studied that the method of strong-motion evaluation for the scenario earthquakes in the Tonami plain fault zone. Probability of the occurrence of an earthquake (M7.3) for this fault zone within 30 years was evaluated as 0.05-6.0% by the subcommittee for long-term Evaluation, the Headquarters for Earthquake Research Promotion.

The hybrid method is adopted as the simulation method for strong-motion evaluation. The hybrid method aims to evaluate strong-motions in a broadband frequency range and is a combination of a deterministic approach using numerical simulation methods, such as the finite difference method (FDM), for low frequency range, and a stochastic approach using the empirical or stochastic Green's function method for high frequency range.

In order to evaluate amplifications of strong-motion in surface soils, we use the empirical formulas according to Matsuoka and Midorikawa (1994) and Fujimoto and Midorikawa (2003). We also adopt a more precise method in which we use the surface soil velocity structure models made from many boring profiles and geological data. The results of Fujimoto and Midorikawa (2003) show higher correlation with those of the precise method using the velocity structure models than the results of Matsuoka and Midorikawa(1994). This suggests that the tuning of models to evaluate site amplifications using proper boring profiles and geological data is indispensable.

Toward more accurate strong-motion evaluations, it is necessary to examine the physical properties of soils from the engineering bedrock up to ground surface, and to perform a precise modeling in which the nonlinear effects of material are took into account.