A Study on Hazard Maps for Scenario Earthquakes along Miura Peninsula Faults

Toru Ishii[1]; Hiroyuki Fujiwara[1]; Yuzuru Hayakawa[1]; Takashi Hayakawa[2]; Toshiaki Sato[2]; Hideaki Shinohara[3]; Michio Morino[4]; Shunsuke Hamada[3]

[1] NIED; [2] Ohsaki Research Institute; [3] OYO; [4] OYO Corp.

A hazard map for scenario earthquake represents a spatial strong-motion distribution in an area that will be caused by a specified future earthquake. In order to make hazard maps for scenario earthquakes in Japan, a methodology to evaluate spatial strong-motion distribution is studied.

Recently, long-term evaluations of active faults and those of large earthquakes along the subduction zones have been presented by the Headquarters for Earthquake Research Promotion based on the newest information and data of active faults and of historical earthquakes all over Japan. These long-term evaluation results are reflected on this study. Heterogeneous fault models of possible earthquakes are established by considering asperities in which slips and stress drops are larger than those in the background area on the fault plane. Three-dimensional propagation characteristics of seismic waves and amplifications in surface layers are estimated based on detailed information and data collected in the mapping area. By using the empirical method based on the attenuation relations, peak values of ground motions and seismic intensities are estimated at all the points which are arranged regularly all over the mapping area with about 1 km spacing. By using the hybrid method, which means by the theoretical method in the long period range and by the semi-empirical method in the short period range, strong-motion time histories on the engineering bedrock are evaluated. The peak ground motions and seismic intensities are also estimated by using the time histories.

The developed procedure and techniques are applied to the characteristic earthquakes along Miura Peninsula Faults, one of the most active major faults in Japan. The hazard maps for four different scenarios are produced and compared to each other. The characteristics of the evaluated ground motions are strongly affected by the heterogeneity of fault parameters, by the rupture propagation on the fault, and by the propagation characteristics of seismic waves. Especially, the hybrid method is very effective to evaluate strong-motions at stations near a fault plane or on a large basin structure.