SIMULATION OF GROUND MOTIONS DURING THE 1993 HOKKAIDO-NANSEI-OKI EARTHQUAKE BY SEMI-EMPIRICAL METHOD

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We simulated strong ground motions during the 1993 Hokkaido-Nansei-Oki, Japan, earthquake (MJMA 7.8) based on its variable-slip rupture model and on its characterized asperity models to verify the characterizing procedure of source models for the strong motion prediction in future earthquakes. The asperity models were characterized by the total seismic moment, the short-period level of the source spectra, and the ratios of the area, the slip amount, and the effective stress on the asperity to those on the entire fault. First, the empirical Green's function method was applied to simulation of the records at Sapporo JMA and Akita JMA, and the following results were obtained:

1) The asperity model whose asperity was arranged at the shallow position according to the final slip distribution of the variable-slip rupture model reproduced the long-period earthquake motion of 10 seconds, but this model produced a little larger short-period earthquake motion of 0.2 - 0.5 seconds than the records.

2) The asperity model whose asperity was arranged at the deep position according to the seismic moment or short-period level distribution of the variable-slip rupture model reproduced the short-period earthquake motion of 0.2 - 0.5 seconds, but this model produced less long-period earthquake motion of 10 seconds than the records.

3) From the above results, the location of the long-period radiation of 10 seconds was different from that of the short-period radiation of 0.2 - 0.5 seconds.

Next, the stochastic Green's function method was applied to the wide area (192,000km2=230,400points) including epicentral region, and the following results were obtained:

1) The asperity model whose asperity was arranged at the shallow position according to the final slip distribution of the variable-slip rupture model produced a little larger seismic intensity than the variable-slip rupture model did.

2) On the other hand, the asperity model whose asperity was arranged at the deep position according to the short-period level distribution of the variable-slip rupture model produced the same seismic intensity as the variable-slip rupture model did.

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