

Examinations toward establishing procedure of evaluating fault parameters for predicting strong motions from intra-slab

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For precise prediction of strong motions from intra-slab earthquakes, it is necessary to establish a new procedure of evaluating fault parameters based on the characteristics of intra-slab earthquakes. Although such studies have been conducted by Sasatani et al. (2006) and Dan et al. (2006), procedures of evaluating fault parameters that have been proposed have not been fully verified by reproduction of the actual earthquake records. Then, in this study, we simulated the ground motion of the intra-slab earthquake that occurred off the coast of Miyagi Prefecture on April 7, 2011 and we pointed out the problem of existing procedures of evaluating fault parameters and suggested the ideas to overcome the problem.

In the case of the intra-slab earthquake of April 7, 2011, there was a possibility that the result of evaluation of strong ground motion using the equation of short period spectral level proposed by Sasatani et al. (2006) or Dan et al. (2006) became too small. But we found that the fault models could not be set due to negative slip amounts on the background area by only increasing the short period spectral level according to the detailed knowledge of this earthquake obtained by Harada and Kamae(2011). For this problem, we developed three new fault models using a method to reduce the area of the asperities while increasing the short period spectral level and using a crack model.

We set five fault models of the intra-slab earthquake off the coast of Miyagi Prefecture on April 7, 2011, which are models just based on the relationships of intra-slab fault parameters by Sasatani et al. (2006), another one by Dan et al. (2006), and newly proposed three fault models. By using these five fault models, we evaluated strong ground motions at several KiK-net stations by the empirical Green's function method. As a result, ground motion evaluation results using Sasatani et al. (2006) and Dan et al. (2006) are smaller than the actual records especially at the observation stations near the epicenter. On the other hand, ground motion evaluation results using the newly proposed three fault models showed better agreements with the actual records.

Keywords: Intra-slab earthquakes, Strong motion prediction, Fault model