Simulation of near-fault strong motion using seismic fault model; current state and future challenges

Yoshiaki Hisada[1]

[1] Kogakuin Univ.

http://kouzou.cc.kogakuin.ac.jp/

We report the current state and the problems for simulating near-fault strong motions using the Irikura recipe (Irikura, 2005), especially from the standpoint of engineering applications. The Irikura recipe is a very useful and reliable tool, and has been widely used for strong motion predictions. However, the recipe still needs some improvements, especially for applying near-fault strong motion from large-scale earthquakes. 1) The physics of asperities, which generate both short- and long-period strong motion, are still unknown. For example, in order to generate the directivity pulses effectively, not only the large slip velocity, but also the discontinuities of the rupture time along the asperities boundaries are needed. On the other hand, inversion studies show that the short-period waves are generated from not only asperities, but also the background areas (i.e., Hartzell et al., 1996). In addition, a large asperity from large earthquakes needs shorter-scale heterogeneities, in order to generate observed strong motions. 2) Empirical Green function method (e.g., Irikura and Kamae, 1999) is not applicable to very near-fault range, because of the usage of the far-field term. In addition, the method underestimates far-field strong motions, because of neglecting the Moho reflection and so on. More accurate Green function should be used, such as those of layered half-spaces (e.g., Hisada, 2005). 3) The fling step from surface faulting should be included, which is easily simulated in near-fault areas (Hisada and Bielak, 2003).