DEVELOPMENT OF DYNAMIC SOURCE INVERSION TO UNDERSTAND MECHANISM OF STRONG MOTION GENERATION

Takeshi MIYAMOTO [1], ***Kimiyuki ASANO*** [2], ***Tomotaka IWATA*** [2]

[1] Graduate School of Science, Kyoto University, Kyoto, Japan
[2] Disaster Prevention Research Institute, Kyoto University, Kyoto, Japan

contact: miyamoto.takeshi.25a@st.kyoto-u.ac.jp

Source rupture processes for many large earthquakes have been estimated by kinematic source inversion methods. Relationships between the inferred kinematic source models and strong ground motions have been discussed in many papers. Spatial distributions of dynamic source parameters on the fault have been estimated mainly by dynamic rupture simulations and, recently, directly by dynamic source inversion (e.g., Gallovič et al., 2019). This method mainly consists of two parts: generating synthetic waveforms (i.e., convolving slip time functions obtained by the dynamic rupture simulation and Green's functions) and updating values of dynamic source parameters randomly using MCMC method so as to fit the observed waveforms. In this study, a dynamic source inversion is developed following Gallovič et al. (2019) and a validation test assuming a simple dynamic source model is being performed to be applied to the 2016 Kumamoto earthquake. After the validation test with 10,000 iterations, probabilistic distributions of values of dynamic source parameters at all control points were obtained from the last 4,000 source models, which showed higher VR values, and the estimated source model was given as the mean values of these distributions at each point. The estimated values of dynamic parameters didn't show a good agreement with those of assumed model, except in the vicinity of the nucleation point, which resulted in the final slip distribution with larger maximum slip and smaller area, whereas the waveforms were almost the same as those generated by the assumed model. To improve efficiency of dynamic source inversion, appropriate width of step size and physics-based constraint conditions for perturbation of dynamic parameters are being considered.