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Ground Motion Simulation of the Near-Fault Motions in Consideration of the Propagation of the Dynamic Rupture

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The near fault ground motions might bring huge amount of damage, such as the 2016 Kumamoto Earthquake (Mj 7.3). Because the source process might play major role for those ground motions at very close to the fault, the usage of the kinematic source model which assumes how the fault is ruptured a priori, is sometimes difficult to model those ground motions. Thus, the dynamic source model that the fault is ruptured based on the physics is useful to model them.

In this study, we have developed the idea to model the near fault ground motions based on the combination of the propagation of the dynamic rupture and the ground motion simulation based on the finite difference modeling, which is very convenient and effective for the large scale simulations. We have used the spectral element method (Galvez et al., 2014), which the modification of the formulation can lead to the more efficient calculation than conventional finite element method for the simulation of the propagation of the dynamic rupture. The finite difference modeling is based on the staggered- grid method (e.g., Graves, 1996) which the research achievements have been accumulated in the field of large-scale ground motions simulation. This approach of combination of these two modeling can lead to the more realistic ground motion modeling and should also be useful for the seismic hazard mitigation for the future hypothetical hazardouns earthquakes, such as the Nankai Trough mega-thrust earthquakes as well as even the inland crustal earthquakes.