

## Validation of FEM and FDM Simulation Codes for Dynamic Earthquake Rupture

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We have developed simulation codes of dynamic earthquake rupture with finite element method and finite difference method. The FEM code with a voxel mesh is formulated by Koketsu et al. (2004) and the FDM code is based on displacement formulation by Kase and Kuge (2001). Fault planes are represented by double nodes, and the thickness of the fault zone is assumed to be zero. We applied the codes to the benchmark tests of spontaneous strike-slip faulting used in the SCEC/USGS dynamic earthquake rupture code verification (Harris et al., 2009), and the benchmark tests of spontaneous dip-slip faulting as well. We assess the accuracy of the numerical methods for dynamic earthquake rupture simulations with the voxel FEM, an unstructured FEM that introduces arbitrary shape of fault plane, and the FDM.