

# FEM calculation of slip response functions in a viscoelastic heterogeneous structure for earthquake generation cycle simulations

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On the Earth simulator (ES), we are now performing the earthquake generation cycle simulation based on a laboratory derived rate- and state-dependent friction law. In usual earthquake generation cycle simulations, the interaction between sub-faults distributed on the plate interface (slip response function) has been evaluated by the analytic expression in a purely elastic half space of Okada(1992). However, for the purpose of the realistic prediction of the earthquake generation, re-distribution of stress due to the post-seismic viscous relaxation in the lower crust or upper mantle should be taken into consideration. In this study, we calculate slip response functions using a visco-elastic FEM code, GeoFEM. In GeoFEM, quasi-static dislocation analysis in viscoelastic heterogeneous structures is conducted using 'split node technique' (Melosh and Raefsky, 1981). The calculated slip response function is parameterized as a superposition of relaxation functions, and sent to calculation of slip evolution on the plate interface (Hori et al., in this meeting).

In this presentation, the calculation of viscoelastic slip response function by GeoFEM, and the parameterization of response functions will be discussed in detail.