Two-dimensional Finite Element Modelling of Ground Deformation and Stress Field Associated with Fault Motion

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ABSTRACT:

Movement of active faults is responsible for large earthquakes, which cause catastrophic damages. Analytical models, due to thier limitations, cannot take into account geometric complexities and lateral variations of the crustal layers. Therefore, numerical models, such as finite element, are essential for consideration of the effect of crustal inhomogeneities on the fault modeling. In this paper, we use the two-dimensional finite element method to investigate coseismic deformation and stress generated by fault motion during the earthquake, while considering inhomogeneities. Linear elastic rheology and plane strain condition are assumed for the elements around the faults, whereas, for joint elements on the fault plane, nonlinear rheology is used. To solve the nonlinear rheology problem, an iterative method is applied. Results from the numerical model in comparison with GPS observations indicate that the crust inhomogeneities should be included in any quantitative model of faulting.