

## Effects of Earth's Lateral Heterogeneous Structures on Coseismic Displacements

# Guangyu Fu[1]; Wenke Sun[2]; Yoichi Fukuda[3]

[1] School of Science, Kyoto Uni.; [2] ERI, Univ Tokyo; [3] Geophysics, Kyoto Univ.

This study presents a new method to study the effects of Earth's lateral inhomogeneous structures on coseismic displacements caused by dislocations within a 3-D spherical earth. We deliberately decompose the effects into two contributions: the effects of seismic sources and the effects of the 3-D structures of the earth. The first part can be obtained easily using the spherical dislocation theory of Sun et al (1996) and the perturbation of seismic source functions (Sato, 1967). The second part can be calculated based on the perturbation method of Wang (1991). We present calculation formulae for six special seismic sources: a vertical strike-slip, two vertical dip-slips perpendicular to each other, and three tensile openings on three perpendicular planes. A combination of the six dislocations is useful to compute the effects of lateral increments on co-seismic deformations resulting from an arbitrary seismic source at an arbitrary position. This new method is suitable to explain the observed coseismic displacements for some great earthquakes such as the 2004 Sumatra earthquake and the 2008 Wenchuan earthquake.