Geophysical Research Abstracts, Vol. 8, 09041, 2006
SRef-ID: 1607-7962/gra/EGU06-A-09041

Scattering of elastic waves in a cracked half-space with topographic features using a finite difference scheme

J.A. Pérez-Ruiz (1,2) and F. Luzón (1,2)

(1) Departamento de Física Aplicada, Universidad de Almería (japerez@ual.es, fluzon@ual.es), (2) Instituto Andaluz de Geofísica

The scattering of elastic waves by cracks in a half-space with topographic features is studied via a finite difference method. Different models with zero-thickness 2D-cracks and cavities embedded in homogeneous media are computed using an explicit formulation in displacements. The free surfaces of these cracks, likewise the superficial topography of the models, are dealt with the zero-stress boundary condition directly. This methodology requires the definition of adjacent fictitious points to the free surfaces. The motion at these points is computed only as a necessary intermediate step to compute appropriately the displacement in each point of the free surfaces of the model. Various canonical models with different configurations are computed. The study of the observed wave motion at this kind of simple models allows understanding the wave field produced in more complex problems. In the case of a planar crack, diffracted waves are trapped between the flat free surface and the upper face of the crack and exhibit several interactions and peaks. However, when the free surface of the medium is not planar and it has topographical irregularities the principal characteristics of wave motion is changed and other frequencies are amplified and different displacement patterns in time domains are observed. In the case of circular cavities, the time where trapped waves are observed is shorter compared to the case of the flat crack.