The flat fault approximation: modelling non planar-geometries in spectral method.

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Non –planarities and more generally geometrical complexities of the fault plane are known to have a strong effect on earthquake dynamic. However, incorporating these non-planarities in numerical modeling of the earthquake cycle is still challenging, mainly because of time consumption.

One widely applied method in the simulation of earthquake cycle is the spectral method (Guebelle & Rice, 1995; Lapusta et al., 2000) for elastodynamic problems. This method takes advantage of the Fast Fourier Transform to decrease the computational time. On the other hand, one serious limitation of this method is that it can handle only planar faults due to the requirement of equi-spaced grid. To overcome this limitation, we developed a method called “flat fault approximation”, that accounts for the first order effect of non-planar geometries and allows to perform rough fault simulation or seamount simulation using a flat fault. This method is based on a regularised boundary element method, using the approximation that the elevation and slope of the fault are small.

We show that this first order effect of the geometry, that is a measure of the curvatures that multiplies the slip along the fault, only change the normal traction along the fault.

Keywords: Fault mechanics, Curvature, Fault geometry, Earthquake cycle simulation

