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Simulating seismic sources with Discrete Element Method

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Description of seismic sources has passed a long way from simple, point-like models proposed in early years of XX century, trough kinematical models of extended source and dynamical models conceptually based on pioneering work of Griffith and Irvin's. The contemporary used dynamical seismic source models are basically based upon the modern formulation of the linear fracture mechanics. In spite of their great success in explaining many features observed in real earthquakes they face a very serious limitation coming from the fact that the gross of the information on the processes in seismic foci comes from far field recordings of seismic waves. These information are very sparse and quit limited. Even enhancement of seismic data by GPS, or satellite interferometry data does not improves situation significantly. The information on natural or induced seismic events are still not sufficient for precise description of physical processes in seismic foci. One of a possibility to improve this situation is using numerical simulations - a powerful tool of contemporary physics.

In this paper we analyse the possibility of using the DEM method to analyse the seismic source processes. We concentrate basically on the DEM method itself as a little know to seismological community, its description, adaptation and analysis with respect to needs of physics of seismic processes. We illustrate its possibility analysing the process of cracking of thin, rather homogeneous tissue under tensional forces.