

Seismic wave simulation in fractured media using a particle method

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The seismic wave propagation in fractured media with a particle method is presented. We use a Hamiltonian Particle Method (HPM) to simulate seismic wave propagation. It is easy to implement discontinuities in the particle method without numerical instability. Furthermore, spatial resolution can be improved only by dividing particles.

We simulate seismic wave propagation in a model with a random oriented single fracture, and implement arbitrary refinement technique to the model. The results are compared with the analytical solutions, and show good agreement with those. Next, we model the propagation of a plane wave through a well-defined fractured region. The results show good agreement with the formulae for effective moduli from existing theories. Our results show that the method is effective to simulate seismic wave propagation in fractured media.

Keywords: particle method, numerical simulation, fractured media, seismic wave propagation