

Joe Andrews 2D code, SCOOT

SCOOT uses a regular hexagonal array of node points. Elements are equilateral triangles. Two components of in-plane velocity are defined at each node point, and stress components are defined in element interiors. Velocity at the nodes of a triangle determines unique values of strain rate in the element interior, so these are simplex finite elements, and there is no hour-glass degeneracy.

Stored variables are velocity and stress (not displacement and force). The solution is stepped though time explicitly with centered leap-frog equations. Inelastic response arises from simply adjusting stress; there is no need to consider equivalent body force.

There is no inherent dissipation in the finite difference equations, and I do not add artificial viscosity. When calculating near-source motion, dispersion of wave speeds at short wavelength is less important than generation of short-period noise at the rupture front. To achieve a smooth solution, I limit the rate of change of stress at the rupture front (time-weakening), which is equivalent to applying artificial viscosity locally. I have used no time weakening in these validation problems.

References

BSSA, v. 63, p. 1375-1391, 1973.

JGR, v. 102, p. 553-571, 1997.

JGR, 110(B1), B01307, 2005.