Benchmark 6 - OLD

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Viscoelastic (Maxwell) relaxation of stresses from a single, finite, dip-slip earthquake in 3D with body forces.

GOALS

Test implementation of gravity for thrust faults.

DETAILED DESCRIPTION

- Model size: same dimensions as Benchmark 5.
- Elastic material properties: Poisson solid, G = 30 GPa
- Maxwell viscoelastic material properties:
  Top layer: ? = 10^{25} Pa-s (essentially elastic)
  Bottom layer: ? = 10^{18} Pa-s

- Density and Gravity: when applicable ? = 3000 kg/m^3; g = 10 m/s^2
- Boundary conditions:
  Bottom pinned
  Sides with normals in the x-direction pinned
  Side at y = max(y) km pinned
  Side at y = 0 km has 0 y-displacement (i.e., symmetry condition applied)
  Top free

- Coarse mesh node spacing: dx = dy = dz = 2 km
- Fault specifications:
  Type: 45° dipping fault
  Location: Strike parallel to y-direction ; Top edge at x = mean(x) – 8 km; Bottom edge at x = mean(x) + 8 km; 0 km ? y ? 16 km; -16 km ? z ? 0 km
  Slip distribution: 1 m of uniform thrust slip (0.707 m in the z-direction and -0.707 m in the x-direction) for 0 km ? y ? 12 km and -12 km ? z ? 0 km with a linear taper to 0 slip at y = 16 km and z = -16 km.

REQUESTED OUTPUT AND RESULTS

Mesh Variations: As memory, time, and patience allow, run models at 1/2, 1/4, and 1/8, etc. the original coarse mesh spacing, investigate variable mesh spacing, and/or employ a variety of element types. For All Benchmark Variations:

- Stresses and displacements along three lines parallel to the y-axis at 0, 1, and 5 km from the fault plane at the depths of 0, 12, 16, 17, and 21 km (e.g. at the surface x=4, 5, and 9 km, at z =

-12, x=16, 17, and 20 km); and three lines parallel to the x-axis at y = 12, 17, and 21, at depths of 0, 12, 16, 17 and 21 below the surface, all results at times of 0, 1, 5 and 10 years.

- CPU time, wallclock time, memory usage info, compiler info, and platform info

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will be used to generate an elastic solution. The ‘best’ viscoelastic answer will be derived via mesh ment and increasing the distance to the model boundaries. Analytical solutions to the viscoelastic solution ng sought if anyone has information.

TIONAL NOTES

run the same meshes both with and without gravity so that the magnitude of the gravitational effect with ce from the fault can be estimated. The effects of gravitational loading (as in BM2) should be relaxed the fault slip is imposed. Alternatively, Winkler nodes could be used to calculate the gravitational ng forces resulting from the deformed upper surface.