Benchmark 3 - OLD

Benchmark 3

Viscoelastic relaxation of stresses resulting from an imposed simple shear strain. No body forces are imposed.

Benchmark 3a: Solve using a Maxwell viscoelastic material rheology

Benchmark 3b: Solve using a Burger's body rheological description

Benchmark 3c: Solve using a power-law material description

GOALS

- Test relevant constitutive relations
- Verify timing of output in specific codes (i.e., is output written at the beginning or end of the step).

DETAILED DESCRIPTION

- Model size: 24 km by 24 km by 24 km (0 km ? x; y ? 24 km; -24 km ? z ? 0 km)
- Elastic material properties: Poisson solid, G = 30 GPa
- Maxwell viscoelastic material properties: ? = 10^{18} Pa-s
- Burger's body material properties: Maxwell element as above, Kelvin-Voigt element has G_{KV} = 10 GPa, $?_M = 10^{17}$ Pa-s
- Power-law material properties: $?_{ref} = 10^{18}$ Pa-s and $?_{ref} = 10^5$ Pa. (Note: This value is chosen because the maximum initial elastic stress is of order 10^6 Pa; although all of that is deviatoric, the deviatoric stress decreases with time.)
- Density and Gravity: None
- Boundary conditions: Bottom pinned
  Sides pinned in y and z; free in x
  Top pinned in y and z; 1 m of displacement imposed in x
- Coarse mesh node spacing: dx = dy = dz = 2 km

ESTED OUTPUT AND RESULTS

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

Benchmark Variations:

Stresses along a path through (0,0,-24) and (24,24,0) at t = 0, 1, 5, and 10 years.

Displacements along a path through (0,0,-24) and (24,24,0) at t = 0, 1, 5, and 10 years.
CPU time, wallclock time, memory usage info, compiler info, and platform info

tions for each material rheology will be posted at geoweb.mit.edu/fe.

NOTES