Benchmark 7 - OLD

Benchmark 7

Elastic solution for a circular strike-slip fault. The conceptual model is an elastic disk of radius 200 km, with a circular left-lateral strike-slip fault forming an inner plug which rotates inside the outer annulus. Because of the symmetry of the problem, radial displacements should vanish and only the first quadrant needs to be modeled. If required, a mesh using cylindrical coordinates can be downloaded from http://geoweb.mit.edu/fe/.

GOALS

- Test techniques and implementation methods for non-planar faults (use of local vs. global coordinate systems, etc.)
- Investigate the grid resolution required to properly resolve non-planar faults.
- Test ability of various codes to model non-planar faults
- Test implementation of boundary conditions in terms of Cartesian and Polar coordinates.
- Code comparison

DETAILED DESCRIPTION

- Model size: Thickness = 40 km; 10 km ? r < 200 km; 0 ? ? ? ?/2
- Elastic material properties: Poisson solid, G = 30 GPa
- Density and Gravity: None
- Boundary conditions: Bottom pinned x-displacement pinned at y = 0 (i.e., ? = 0) y-displacement pinned at x = 0 (i.e., ? = ?/2)
- Coarse mesh node spacing: dr = dz = 2 km; d? = 2 degrees
- Fault specifications: Type: Vertical strike-slip Location: r = 100 km; -16 km ? z ? 0 km Slip distribution: 1 m of uniform left lateral slip from -12 km ? z ? 0 km with a linear taper to 0 slip at fault tip (z = -16 km)

ESTED OUTPUT AND RESULTS

/ariations: 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 and displacements along a line running radially at ? = 45 degrees, and lines running with constant r = 95, 99, 101, and 105 km, 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

wer will be derived via mesh refinement. There will also be a solution generated using Okada point
nfinite halfspace.

NOTES

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blem definitions: http://www-gpsg.mit.edu/fe/Meshes.html

K 7 MESH GENERATION

shes of different resolution have been built to represent the BM7 model domain. The grids above are
'S and GMV format. See the image gallery for pictures of the mesh.

angulation and smooth the triangles

Command File: bm7_cyl_pts2.lgi
UT: id_fault.inp
lt.gmv

om7_cyl_pts2.lgi

s:

and File: smooth.lgi
.gmv
ass1a.gmv

produce a tet mesh

e: stack.lgi
mv
p

_tets.lgi

ile Size: 31.442698 Mbytes bm7_files.tar.gz

#nodes	#elements
16968	87219
1364	2589
21081	100773
25732	126516
30025	145379
36229	174108
42533	208931
47823	230242

ve been built to represent the BM7 model domain. The grids below are available in AVS and GMV

2d_no_
refine0_
refine2
refine4
refine6