Session 5: Future Directions for SEAS

SCEC

Group planning for 2022

- Finalize new/tentative benchmarks for 2022 SCEC proposal (due Nov. 23rd).
- Analyze benchmark results for new benchmarks (BP6-QD-A/S/C and BP7-QD/FD-A/S) - May 2022 (?)

Group planning for 2022 (results from poll)

- Analyze benchmark results for new benchmarks (BP6-QD-A/S/C and BP7-QD/FD-A/S) - May, or summer 2022 (?)
  - BP6 - 11 confirmed modelers, 10 possible
  - BP7 - 8 confirmed modelers, 10 possible

Future benchmarks (results from poll)

- Suggested problems with most interest (from 28 responses):
  - 2D FD dipping fault (11)
  - QD multiple faults (11)
  - Rough faults (12)
  - Bulk elastic heterogeneity (13)

Future benchmarks (results from poll)

- Suggested problems with most current participation (from 28 responses):
  - Alternative RS formulations (7)
  - Flash heating (9)
  - Bimaterial interfaces (7)
  - Bulk elastic heterogeneity (8)

Building on current benchmark problems

BP1/2 and BP3: 2D problems of vertical and dipping faults
Inertial effects?, bulk elastic heterogeneity? and bimaterial effects?, bulk viscoelasticity?
=> extensions to parallel or splay faults?

BP6: 2D problem with fluid effects
Dilatancy?,permeability evolution?, poroelasticity?, inertial effects?, enhanced dynamic weakening?

BP7: 3D problem focused on earthquake nucleation
Alternative friction laws?, dilatancy?, fault roughness?, enhanced dynamic weakening?

BP4-5: 3D problem with longer fault and dynamic rupture (could modify for slow-slip events)
Fault roughness?, dilatancy?, bimaterial effects?, enhanced dynamic weakening?

Recommendations for future research beyond 2022

1. Maintain the goal of maximizing participation
   a. Insight from geodynamic modelers
   b. Pick low-hanging fruit for future benchmarks?
2. Computational challenges are increasing with increasing complexity of SEAS problems. Push towards HPC?
3. Determine metrics for comparing simulation results in complicated models at marginal resolutions
4. Exercises focused on examining sensitivity of numerically-determined source (including slow-slip events) properties and observables (e.g. rupture speed, duration, ground motions) to numerical procedures (e.g. discretization, velocity thresholds, QS-dynamic switching schemes)
5. Verification efforts for subduction zones and relation to SZ4D MCS efforts?
6. Comparison exercise with EQ simulators like RSQSim