Gamra: Earthquake Modeling without Meshing

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Gamra

- Massively parallel, adaptive, finite difference solver for variable moduli elasto-statics.
- We need special treatment of faults within a cartesian grid



• We use the Immersed Interface Method (IIM) to carefully subtract the infinities.

Okada Analytic Test



Tohoku-Oki 2011 Co-seismic displacement



Tohoku-Oki 2011 Full 3D structure



Tohoku-Oki 2011 Displacement vectors and Mesh



Landers 1992 426 fault segments



Landers 1992 Ratio of finest/coarsest mesh=32



Landers 1992 Displacement



Next Steps

- Topography/Spherical Earth
 - IIM can be applied to external boundaries as well
- Visco-elastic rheology and time-dependence
- Frictional faults
- Dynamic Rupture