Future Hercules Developments

Doriam Restrepo
Hercules

The Octree-based finite element parallel software developed by the Quake group at Carnegie Mellon (Tu et al., 2006a,b) for the simulation of wave propagation in anelastic media due to earthquakes generated by kinematic sources.

**Input Data:** Vp, Vs, density, and Q Models

**Meshing:** Octree elements (Brick Tri-linear elements)

**Source Gen:** Kinematic Fault Rupture Models (Double-couples)

**Solving:** Explicit Time Integration
Future Work

● Implement Bounding Surface Models for Sands and Cohesionless Material

● Branch Integration
  ○ Nonlinear Topography. Completed.
  ○ Nonlinear Topography + FreqDep Attenuation (In progress).
  ○ DRM (Completed for flat simulations). Must be integrated with Nonlinear Topography (Not started).

● GPU Version
  ○ Flat anelastic simulations. Completed.
  ○ Integration with Nonlinear Topography (Not started).
Future Work: Facilitate Hercules for Practitioners Use

● Developing the necessary interfaces to generate effective seismic forces for engineering codes.
  ○ **Best scenario:** Make Hercules compatible with commercial engineering software i.e., Ansys, ETABS, SAP2000, MIDAS GTS NX.

● Make Hercules an auxiliary engineering tool for:
  ○ 3D Slope stability analysis. In progress.
  ○ 3D Tunnel analysis as an special case of topography.
  ○ Soil Structure/City Interaction problems by improving our current building models.
Thanks
Garner Valley