Gale: Large Scale Tectonics Modeling With Free Software

Computational Infrastructure for Geodynamics (CIG). In response to requests from the long time-scale tectonics community, has developed Gale, a parallel 2D and 3D finite element code. Gale’s focus is on orogenesis, rifting, and subduction, although it is flexible enough to be applied to such diverse problems as coronae formation on Venus and 3D evolution of crustal fault systems. Gale solves the Stokes and heat transport equations with a large selection of viscous and plastic rheologies. Material properties are tracked using particles, allowing Gale to accurately track interfaces and simulate large deformations. In addition, Gale has a true free surface and supports a wide variety of boundary conditions, including inflow/outflow, fixed, and stress. It is flexible enough to be applied to such diverse problems as coronae formation on Venus and 3D evolution of crustal fault systems.

Gale Adapts to the Terrain

Gale is exhaustively documented with a 90+ page manual. Cookbook examples demonstrating how to use major features coupled with prebuilt serial binaries for Linux, Mac, and Windows make it easy to get started with small problems. For larger problems on standard VTK format for easy visualization with ParaView, MayaVI, or simple ASCII format for further data analysis, or directly output in the standard VTK format for easy visualization with ParaView, MayaVI, or VisIt.

Usability

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Future Directions

Gale continues to be developed, with the next release, slated for January 2008, implementing frictional boundary conditions, a simple API for plug-in in custom surface process models, and easier visualization of large parallel runs.