

CIG: Software for the Geophysics Community

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Computational Infrastructure for Geodynamics (CIG) is a membership-governed organization that supports and promotes Earth science by providing state-of-the-art tools for computational geophysics using modern software development practices. CIG currently has 36 member institutions and 5 foreign affiliates. CIG, managed by Caltech for the NSF, consists of: (a) a coordinated effort to develop reusable, well-documented and open-source geodynamics software; (b) the basic building blocks — an infrastructure layer — of software by which state-of-the-art modeling codes are quickly assembled; (c) extension of existing software frameworks to interlink multiple codes and data through a superstructure layer; (d) strategic partnerships with the larger world of computational science and geoinformatics; and (e) specialized training and workshops for both the geodynamics and larger Earth science communities.

CIG currently has working groups and active software development in several fields within geophysics: mantle convection, long- and short-term tectonics, and computational seismology. Working groups for magma dynamics and the geodynamo are still nucleating. CIG is both reengineering existing codes and developing new software packages. In mantle convection, CIG is maintaining and distributing the latest version of the CitCom suite of finite element codes and is initiating the development of an entirely new code for compressible convection in a sphere. In long-term tectonics, CIG is developing GALE, a code for solving large three-dimensional problems of crustal evolution and basin formation. The short-term tectonics working group, in collaboration with a working group at the Southern California Earthquake Center (SCEC), is developing PyLith, a finite element code for pre- and post- seismic deformation and earthquake rupture dynamics. For the computational seismology community, CIG is reengineering a suite of seismic wave propagation codes, including SPECFEM, incorporating the Pyre superstructure framework. In addition, CIG is developing a suite of tools to compare modeling results, based on sets of community-developed benchmarks. These benchmarks are being integrated with the CIG software repository and build procedure. All CIG software can be found via the CIG website. Geophysics researchers are encouraged to participate in the CIG community, CIG-supported workshops and training sessions, and to visit our website, <http://www.geodynamics.org> to sign up for various mailing lists.