GeoFEST(P) is a computer program written for use in the QuakeSim project, which is devoted to development and improvement of means of computational simulation of earthquakes. GeoFEST(P) models interacting earthquake fault systems from the fault-nucleation to the tectonic scale. The development of GeoFEST(P) has involved coupling of two programs: GeoFEST and the Pyramid Adaptive Mesh Refinement Library. GeoFEST is a message-passing-interface-parallel code that utilizes a finite-element technique to simulate evolution of stress, fault slip, and plastic/elastic deformation in realistic materials like those of faulted regions of the crust of the Earth. The outputs of SOFTC are (1) phases and amplitudes as functions of time and frequency for cross-correlated received signals and (2) phases and amplitudes as functions of time, station, and tone number for the calibration tones. GeoFEST was created to be as accurate as possible, capable of processing essentially any VLBI data, pass strong debugging tests, have a simple user interface, and have no platform dependencies. GeoFEST is written modularly in the C programming language. The great advantage of implementing a correlator in software, in contradistinction to hardware, is that it becomes relatively easy and much less expensive and time-consuming to adapt, modify, improve, and update the correlator.

This work was done by Andrea Donnellan, Jay Parker, Gregory Lyzena, Michele Judd, P. Peggy Li, Charles Norton, Edwin Tisdale, and Robert Granat of Caltech for NASA’s Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-41079.

SOFTC: A Software Correlator for VLBI

NASA’s Jet Propulsion Laboratory, Pasadena, California

SOFTC is an advanced software implementation of a signal correlator for very-long-baseline interferometry (VLBI) for measuring positions of natural celestial objects and distant spacecraft. Because of increases in processing speeds of general-purpose computers, software VLBI correlators have become viable alternatives to hardware ones. The input to SOFTC consists of digitized samples of raw VLBI-antenna received-signal voltages. Optionally, SOFTC also tracks calibration tones superimposed on the received signals. The outputs of SOFTC are (1) phases and amplitudes as functions of time and frequency for cross-correlated received signals and (2) phases and amplitudes as functions of time, station, and tone number for the calibration tones. SOFTC was created to be as accurate as possible, capable of processing essentially any VLBI data, pass strong debugging tests, have a simple user interface, and have no platform dependencies. SOFTC is written modularly in the C programming language. The great advantage of implementing a correlator in software, in contradistinction to hardware, is that it becomes relatively easy and much less expensive and time-consuming to adapt, modify, improve, and update the correlator.

This program was written by Stephen Low of Caltech for NASA’s Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1).

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (626) 395-2322. Refer to NPO-41072.

Progress in Computational Simulation of Earthquakes

NASA’s Jet Propulsion Laboratory, Pasadena, California

Models of Landers, CA, Earthquake Deformation are shown at two resolutions. These images show the accuracy improvement going from 82,000 finite elements on four processors (left) to 1.4 million finite elements on 64 processors (right).