**Software for Optimizing Quality Assurance of Other Software**

Software assurance is the planned and systematic set of activities that ensures that software processes and products conform to requirements, standards, and procedures. Examples of such activities are the following: code inspections, unit tests, design reviews, performance analyses, construction of traceability matrices, etc. In practice, software development projects have only limited resources (e.g., schedule, budget, and availability of personnel) to cover the entire development effort, of which assurance is but a part. Projects must therefore select judiciously from among the possible assurance activities. At its heart, this can be viewed as an optimization problem; namely, to determine the allocation of limited resources (time, money, and personnel) to minimize risk or, alternatively, to minimize the resources needed to reduce risk to an acceptable level. The end result of the work reported here is a means to optimize quality-assurance activities, both to cover the entire development effort, of which assurance is but a part. Projects must therefore select judiciously from among the possible assurance activities. At its heart, this can be viewed as an optimization problem; namely, to determine the allocation of limited resources (time, money, and personnel) to minimize risk or, alternatively, to minimize the resources needed to reduce risk to an acceptable level. The end result of the work reported here is a means to optimize quality-assurance activities, both to cover the entire development effort, of which assurance is but a part.

This innovation was developed by Martin Feather and Steven Cornford of Caltech and Tim Menzies of the University of British Columbia 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 Don Hart of the California Institute of Technology at (818) 393-3425. Refer to NPO-30578.

**The TechSat 21 Autonomous Sciencecraft Experiment**

Software has been developed to perform a number of functions essential to autonomous operation in the Autonomous Sciencecraft Experiment (ASE), which is scheduled to be demonstrated aboard a constellation of three spacecraft, denoted TechSat 21, to be launched by the Air Force into orbit around the Earth in January 2006. A prior version of this software was reported in “Software for an Autonomous Constellation of Satellites” (NPO-30355), NASA Tech Briefs, Vol. 26, No. 11 (November 2002), page 44.

The software includes the following components:

- Algorithms to analyze image data, generate scientific data products, and detect conditions, features, and events of potential scientific interest;
- A program that uses component-based computational models of hardware to analyze anomalous situations and to generate novel command sequences, including (when possible) commands to repair components diagnosed as faulty;
- A robust-execution-management component that uses the Spacecraft Command Language (SCL) software to enable event-driven processing and low-level autonomy; and
- The Continuous Activity Scheduling, Planning, Execution, and Replanning (CASPER) program for replanning activities, including downlink sessions, on the basis of scientific observations performed during previous orbit cycles.

This program was written by Robert Sherwood, Russell Knight, Gregg Rabideau, Steve Chien, Daniel Tran, Benjamin Gichy, Rebecca Castañó, Timothy Stough, and Ashley Davies 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 Don Hart of the California Institute of Technology at (818) 393-3425. Refer to NPO-30578.

**Software for Analyzing Laminar-to-Turbulent Flow Transitions**

Langley Stability and Transition Analysis Codes (LASTRAC) is a set of engineering software tools developed with the C++ language and modern software technologies for use in analyzing transition from laminar to turbulent flows. LASTRAC is a product of ongoing NASA Langley research projects related to transition flow physics modeling and simulations. It is intended to be a set of easy-to-use engineering tools that can be applied to routine engineering design studies. At the current stage, LASTRAC is capable of performing transition calculations based on linear stability theory (LST) or linear and nonlinear parabolized stability equations (PSE) for a broad range of flow regimes and configurations of interest for the design of low-speed as well as supersonic and hypersonic vehicles. At present, LASTRAC is limited to two-dimensional, axisymmetric, or infinite flows.