Software

Updated System-Availability and Resource-Allocation Program

A second version of the Availability, Cost and Resource Allocation (ACARA) computer program has become available. The first version was reported in "System-Availability and Resource-Allocation Program" (LEW-15713), *NASA Tech Briefs*, Vol. 19, No. 8 (August 1995), page 54. To recapitulate: ACARA analyzes the availability, mean-time-between-failures of components, life-cycle costs, and scheduling of resources of a complex system of equipment. ACARA uses a statistical Monte Carlo method to simulate the failure and repair of components while complying with user-specified constraints on spare parts and resources. ACARA evaluates the performance of the system on the basis of a mathematical model developed from a block-diagram representation. The previous version utilized the MS-DOS operating system and could not be run by use of the most recent versions of the Windows operating system. The current version incorporates the algorithms of the previous version but is compatible with Windows and utilizes menus and a file-management approach typical of Windows-based software.

This program was written by Larry Viterna and Dale Stalnaker of **Glenn Research Center**. *Further information is contained in a TSP (see page 1).*

Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Commercial Technology Office, Attn: Steve Fedor, Mail Stop 4–8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-17308.

Routines for Computing Pressure Drops in Venturis

A set of computer-program routines has been developed for calculating pressure drops and recoveries of flows through standard venturis, nozzle venturis, and orifices. Relative to prior methods used for such calculations, the method implemented by these routines offers greater accuracy because it involves fewer simplifying assumptions and is more generally applicable to wide ranges of flow conditions. These routines are based on conservation of momentum and energy equations for real nonideal fluids, the properties of which are calculated by curve-fitting subroutines based on empirical properties data. These routines are capable of representing cavitating, choked, non-cavitating, and unchoked flow conditions for liquids, gases, and supercritical fluids. For a computation of flow through a given venturi, nozzle venturi, or orifice, the routines determine which flow condition occurs: First, they calculate a throat pressure under the assumption that the flow is unchoked or non-cavitating, then they calculate the throat pressure under the assumption that the flow is choked or cavitating. The assumption that yields the higher throat pressure is selected as the correct one.

This program was written by Laurence de Quay of **Stennis Space Center**.

Inquiries concerning rights for the commercial use of this invention should be addressed to the Intellectual Property Manager, Stennis Space Center, (228) 688-1929. Refer to SSC-00161.

Software for Fault-Tolerant Matrix Multiplication

Formal Linear Algebra Recovery Environment is a computer program for high-performance, fault-tolerant matrix multiplication. The program is based on an extension of the prior theory and practice of fault-tolerant matrix·matrix multiplication of the form C = AB. This extension provides low-overhead methods for detecting errors, not only in C, but also in A and/or B. These methods enable the detection of all errors as long as, in a given case, only one entry in A, B, or C is corrupted. The program also provides for following a low-overhead rollback approach to correct errors once detected. Results of computational experiments have demonstrated that the methods implemented in this program work well in practice while imposing an acceptably low level of overhead, relative to high-performance matrix-multiplication methods that do not afford fault tolerance.

This program was written by Daniel Katz, Edwin Tisdale, Enrique Quintana-Ortí, John Gunnels, and Robert van de Geijn 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-30395.