Facilitating Navigation Through Large Archives

Automated Visual Access (AVA) is a computer program that effectively makes a large collection of information visible in a manner that enables a user to quickly and efficiently locate information resources, with minimal need for conventional keyword searches and perusal of complex hierarchical directory systems. AVA includes three key components: (1) a taxonomy that comprises a collection of words and phrases, clustered according to meaning, that are used to classify information resources; (2) a statistical indexing and scoring engine; and (3) a component that generates a graphical user interface that uses the scoring data to generate a visual map of resources and topics. The top level of an AVA display is a pictorial representation of an information archive. The user enters the depicted archive by either clicking on a depiction of subject area cluster, selecting a topic from a list, or entering a query into a text box. The resulting display enables the user to view candidate information entities at various levels of detail. Resources are grouped spatially by topic with greatest generality at the top layer and increasing detail with depth. The user can zoom in or out of specific sites or into greater or lesser content detail.

This program was written by Robert O. Shelton of **Johnson Space Center**, *Stephanie L. Smith of LinCom, and Dat Truong and Terry R. Hodgson of Science Applications International Corp.*

The code is copyrighted and is available for licensing. For further information, contact the Johnson Technology Transfer Office at (281) 483-3809.
MSC-23542

Program for Weibull Analysis of Fatigue Data

A Fortran computer program has been written for performing statistical analyses of fatigue-test data that are assumed to be adequately represented by a two-parameter Weibull distribution. This program calculates the following:

- Maximum-likelihood estimates of the Weibull distribution;
- Data for contour plots of relative likelihood for two parameters;
- Data for contour plots of joint confidence regions;
- Data for the profile likelihood of the Weibull-distribution parameters;
- Data for the profile likelihood of any percentile of the distribution; and
- Likelihood-based confidence intervals for parameters and/or percentiles of the distribution.

The program can account for tests that are suspended without failure (the statistical term for such suspension of tests is “censoring”). The analytical approach followed in this program for the software is valid for type-I censoring, which is the removal of unfailed units at pre-specified times. Confidence regions and intervals are calculated by use of the likelihood-ratio method.

This program was written by Timothy L. Krantz of the Vehicle Technology Center of the U.S. Army Research Laboratory for **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-17401-1.

Comprehensive Micromechanics-Analysis Code — Version 4.0

Version 4.0 of the Micromechanics Analysis Code With Generalized Method of Cells (MAC/GMC) has been developed as an improved means of computational simulation of advanced composite materials. The previous version of MAC/GMC was described in “Comprehensive Micromechanics-Analysis Code” (LEW-16870), *NASA Tech Briefs*, Vol. 24, No. 6 (June 2000), page 38. To recapitulate: MAC/GMC is a computer program that predicts the elastic and inelastic thermomechanical responses of continuous and discontinuous composite materials with arbitrary internal microstructures and reinforcement shapes. The predictive capability of MAC/GMC rests on a model known as the generalized method of cells (GMC) — a continuum-based model of micromechanics that provides closed-form expressions for the macroscopic response of a composite material in terms of the properties, sizes, shapes, and responses of the individual constituents or phases that make up the material. Enhancements in version 4.0 include a capability for modeling thermomechanically and electromagnetically coupled (“smart”) materials; a more-accurate (high-fidelity) version of the GMC; a capability to simulate discontinuous plies within a laminate; additional constitutive models of materials; expanded yield-surface-analysis capabilities; and expanded failure-analysis and life-prediction capabilities on both the microscopic and macroscopic scales.

This program was written by S. M. Arnold of **Glenn Research Center** *and B. A. Bednarcyk of Ohio Aerospace Institute. 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-17495-1.

Component-Based Visualization System

A software system has been developed that gives engineers and operations personnel with no “formal” programming expertise, but who are familiar with the Microsoft Windows operating system, the ability to create visualization displays to monitor the health and performance of aircraft/spacecraft. This software system is currently supporting the X38 V201 spacecraft component/system testing and is intended to give users the ability to create, test, deploy, and certify their subsystem displays in a fraction of the time that it would take to do so using previous software and programming methods. Within the visualization system there are three major components: the developer, the deployer, and the widget set. The developer is a blank canvas with widget menu items that give users the ability to easily create displays. The deployer is an application that allows for the deployment of the displays created using the developer application. The deployer has additional functionality that the developer does not have, such as printing of displays, screen captures to files, windowing of displays, and also serves as the interface into the documentation archive and help system. The third major component is the widget set. The widgets are the visual representation of the items that will make up the display (i.e., meters, dials, buttons, numerical indicators, string indicators, and the like). This software was developed using Visual C++ and