

contains error trapping and input file format verification, which allows clear visibility into the input data structure and intermediate calculations

This work was done by Pedro Lopez and Winston Wang of The Boeing Co. for Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809. MSC-24963-1

Probabilistic Fatigue Damage Program (FATIG)

FATIG computes fatigue damage/fatigue life using the stress rms (root mean square) value, the total number of cycles, and S-N curve parameters. The damage is computed by the following methods: (a) traditional method using Miner's rule with stress cycles determined from a Rayleigh distribution up to $3 \times \sigma$; and (b) classical fatigue damage formula involving the Gamma function, which is derived from the integral version of Miner's rule. The integration is carried out over all stress amplitudes.

This software solves the problem of probabilistic fatigue damage using the integral form of the Palmgren-Miner rule. The software computes fatigue life using an approach involving all stress amplitudes, up to $N \times \sigma$, as specified by the user.

It can be used in the design of structural components subjected to random dynamic loading, or by any stress analyst with minimal training for fatigue life estimates of structural components.

This work was done by Constantine Michalopoulos of The Boeing Co. for Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809. MSC-24975-1

ASCENT Program

The ASCENT program solves the three-dimensional motion and attendant structural loading on a flexible vehicle incorporating, optionally, an active analog thrust control system, aerodynamic effects, and staging of multiple bodies.

ASCENT solves the technical problems of loads, accelerations, and displacements of a flexible vehicle; staging of the upper stage from the lower stage; effects of thrust oscillations on the vehicle; a payload's relative motion; the effect of fluid sloshing on vehicle; and the effect of winds and gusts on the vehicle (on the ground or aloft) in a continuous analysis.

The ATTACH ASCENT Loads program reads output from the ASCENT flexible body loads program, and calcu-

lates the approximate load indicators for the time interval under consideration. It calculates the load indicator values from pre-launch to the end of the first stage.

This work was done by Richard Brown, Gary Collier, Richard Heckenlaible, Edward Dougherty, James Dolenz, and Iain Ross of The Boeing Company for Johnson Space Center. For further information, contact the JSC Innovation Partnerships Office at (281) 483-3809. MSC-24978-1/9-1

JPL Genesis and Rapid Intensification Processes (GRIP) Portal

Satellite observations can play a very important role in airborne field campaigns, since they provide a comprehensive description of the environment that is essential for the experiment design, flight planning, and post-experiment scientific data analysis. In the past, it has been difficult to fully utilize data from multiple NASA satellites due to the large data volume, the complexity of accessing NASA's data in near-real-time (NRT), as well as the lack of software tools to interact with multi-sensor information.

The JPL GRIP Portal is a Web portal that serves a comprehensive set of NRT observation data sets from NASA and NOAA satellites describing the atmospheric and oceanic environments related to the genesis and intensification of the tropical storms in the North Atlantic Ocean. Together with the model forecast data from four major global atmospheric models, this portal provides a useful tool for the scientists and forecasters in planning and monitoring the NASA GRIP field campaign during the 2010 Atlantic Ocean hurricane season.

This portal uses the Google Earth plug-in to visualize various types of data sets, such as 2D maps, wind vectors, streamlines, 3D data sets presented at series of vertical cross-sections or pointwise vertical profiles, and hurricane best tracks and forecast tracks. Additionally, it allows users to overlap multiple data sets, change the opacity of each image layer, generate animations on the fly with selected data sets, and compare the observation data with the model forecast using two independent calendars. The portal also provides the capability to identify the geographic location of any point of interest.

In addition to supporting the airborne mission planning, the NRT data and portal will serve as a very rich source of information during the post-field campaign analysis stage of the airborne

experiment. By including a diverse set of satellite observations and model forecasts, it provides a good spatial and temporal context for the high-resolution, but limited in space and time, airborne observations.

This work was done by Brian W. Knosp, P. Peggy Li, Quoc A. Vu, Francis J. Turk, Tsae-Pyng J. Shen, Svetla M. Hristova-Velova, Stephen J. Licata, and William L. Poulsen of Caltech for NASA's Jet Propulsion Laboratory. For more information, contact iaoffice@jpl.nasa.gov.

This software is available for commercial licensing. Please contact Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-47787.

Data::Downloader

Downloading and organizing large amounts of files is challenging, and often done using ad hoc methods. This software is capable of downloading and organizing files as an OpenSearch client. It can subscribe to RSS (Really Simple Syndication) feeds and Atom feeds containing arbitrary metadata, and maintains a local content addressable data store. It uses existing standards for obtaining the files, and uses efficient techniques for storing the files. Novel features include symbolic links to maintain a sane directory structure, checksums for validating file integrity during transfer and storage, and flexible use of server-provided metadata.

This work was done by Brian Duggan of Adnet Systems and Curt Tilmes of NASA for Goddard Space Flight Center. For further information, contact the Goddard Innovative Partnerships Office at (301) 286-5810. GSC-16203-1.

Fault Tolerance Middleware for a Multi-Core System

Fault Tolerance Middleware (FTM) provides a framework to run on a dedicated core of a multi-core system and handles detection of single-event upsets (SEUs), and the responses to those SEUs, occurring in an application running on multiple cores of the processor. This software was written expressly for a multi-core system and can support different kinds of fault strategies, such as introspection, algorithm-based fault tolerance (ABFT), and triple modular redundancy (TMR). It focuses on providing fault tolerance for the application code, and represents the first step in a plan to eventually include fault tolerance in message passing and the FTM itself.