TEAMS Model Analyzer

NASA's Jet Propulsion Laboratory, Pasadena, California

The TEAMS model analyzer is a supporting tool developed to work with models created with TEAMS (Testability, Engineering, and Maintenance System), which was developed by QSI.

In an effort to reduce the time spent in the manual process that each TEAMS modeler must perform in the preparation of reporting for model reviews, a new tool has been developed as an aid to models developed in TEAMS. The software allows for the viewing, reporting, and checking of TEAMS models that are checked into the TEAMS model database. The software allows the user to selectively model in a hierarchical tree outline view that displays the components, failure modes, and ports. The reporting features allow the user to quickly gather statistics about the model, and generate an input/output report pertaining to all of the components. Rules can be automatically validated against the model, with a report generated containing resulting inconsistencies.

In addition to reducing manual effort, this software also provides an automated process framework for the Verification and Validation (V&V) effort that will follow development of these models. The aid of such an automated tool would have a significant impact on the V&V process.

This work was done by Raffi P. Tikidjian 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 Daniel Broderick of the California Institute of Technology at danielb@caltech.edu. Refer to NPO-46842.

Probabilistic Design and Analysis Framework

John H. Glenn Research Center, Cleveland, Ohio

PRODAF is a software package designed to aid analysts and designers in conducting probabilistic analysis of components and systems. PRODAF can integrate multiple analysis programs to ease the tedious process of conducting a complex analysis process that requires the use of multiple software packages. The work uses a commercial finite element analysis (FEA) program with modules from NESSUS to conduct a probabilistic analysis of a hypothetical turbine blade, disk, and shaft model. PRODAF applies the response surface method, at the component level, and extrapolates the component-level responses to the system level. Hypothetical components of a gas turbine engine are first deterministically modeled using FEA. Variations in selected geometrical dimensions and loading conditions are analyzed to determine the effects of the stress state within each component.

Geometric variations include the cord length and height for the blade, inner radius, outer radius, and thickness, which are varied for the disk. Probabilistic analysis is carried out using developing software packages like System Uncertainty Analysis (SUA) and PRODAF. PRODAF was used with a commercial deterministic FEA program in conjunction with modules from the probabilistic analysis program, NESTEM, to perturb loads and geometries to provide a reliability and sensitivity analysis. PRODAF simplified the handling of data among the various programs involved, and will work with many commercial and open-source deterministic programs, probabilistic programs, or modules.

This work was done by William C. Strack and Vinod K. Nagpal of N&R Engineering 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, Innovative Partnerships Office, Attn: Steve Fedor, Mail Stop 4–8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-18372-1.

Excavator Design Validation

John H. Glenn Research Center, Cleveland, Ohio

The Excavator Design Validation tool verifies excavator designs by automatically generating control systems and modeling their performance in an accurate simulation of their expected environment. Part of this software design includes interfacing with human operations that can be included in simulation-based studies and validation. This is essential for assessing productivity, versatility, and reliability.

This software combines automatic control system generation from CAD (computer-aided design) models, rapid validation of complex mechanism designs, and detailed models of the environment including soil, dust, temperature, remote supervision, and communication latency to create a system of high value. Unique algorithms have been created for controlling and simulating complex robotic mechanisms automatically from just a CAD description. These algorithms are implemented as a commercial cross-platform C++ software toolkit that is configurable using the Extensible Markup Language (XML).

The algorithms work with virtually any mobile robotic mechanisms using module descriptions that adhere to the XML standard. In addition, high-fidelity, real-