Virtual Satellite Integration Environment

Advatech Pacific, Inc.

Technical Abstract

An integrated environment for rapid design studies of small satellite missions will be developed. This environment will be designed to streamline processes at the NASA Ames Mission Design Center. Several key concepts are introduced. The proposed environment introduces modern Product Data Management and Product Lifecycle Management (PDM/PLM) tools and processes to satellite mission design. Specifically, the notion of product structure, or bill of material (BOM), is expanded to a simulation BOM, or SBOM, with the capability to manage engineering analysis data, files and processes in the context of a product, in this case satellite mission. This approach constitutes a significant step beyond mere document management, which limits the traceability of which model of which analysis belongs to which version of the geometry or other analysis. It is a key enabler for model re-use. A Linked Model Environment (LME), i.e. an environment where all engineering analysis models are associatively linked, which was developed concurrently in the commercial aerospace and automotive industry, will extended to satellite mission design. This environment significantly reduces the amount of manual intervention engineers have to perform to translate information from one simulation tool to another. The concept of digital mockup (DMU), which typically addresses form and fit of components in an assembly, is expanded to include function, such that the inclusion of components in a satellite assembly that are functionally incompatible is rejected. Repetitive-iterative engineering tasks will be automated with the help of an integration framework tool which automates the execution of a sequence of codes and provides the capability to wrap drivers like optimizers or quality engineering tools around an automated analysis workflow.

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2007 Phase II
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Open System of Agile Ground Stations

Espace Inc.

Technical Abstract

The Phase I effort demonstrated, through actual development and tests with a spacecraft system, the technical and programmatic feasibility of developing, within the SBIR phase II program, the prototype of an innovative and low-cost Open System of Agile Ground Stations using the new commercial Software Defined Radio (SDR) technology. The prototype agile stations will operate in a wide band used by NASA and other science and technology satellites and will be able to switch between communications frequencies, modes and data protocols, in real time, to service multiple satellites. The stations will be remotely programmable to store portfolios of satellite applications, and will switch between applications on demand from the largely automatized Ground Station Management and Maintenance Center (GSMMC). Multiple station sites will provide a high level of back-up capability and link opportunities at up to 3.5Mbits/s and will eliminate down-times. The GSMMC will interface with the different satellite Mission Operation Centers, and oversee the scheduling and programming of the station system. The prototype system will be implemented on the existing HETE-2 network of three stations, opening that system to service multiple missions at very low cost, while significantly enhancing its capabilities and performance.

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