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MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Structures I - Development and Verification (Space Vehicles and Components) (1)

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CREATING A RANDOM VIBRATION COMPONENT TEST SPECIFICATION FOR STSAT (SCIENCE AND TECHNOLOGY SATELLITE)

Abstract

The report focuses on the final finite element model of STSAT, mechanical analysis with example of creating qualification vibration test specification for one of the critical component. The finite element model includes the bus and payload of STSAT. All the design and analysis were performed in MSC.Patran/Nastran. The spacecraft model has a total of 51718 nodes and 47816 elements. Combined quasi-static loads analysis was performed. Modal analysis has been computed in the range [0-500Hz] (in order to have a sufficient modal analysis basis for sine responses). Table with associated effective mass and inertia with a description of the more significant modes was obtained. Sinusoidal and Random vibration response analysis were performed for qualification test levels. For different most loaded parts Acceleration Spectral Density and Stress Response Graphs were obtained. One of the purposes for performing a random vibration analysis is to create a component test level specification. With a finite element model, a random vibration analysis can be performed to predict acceleration responses from 20 Hz to 2000 Hz. This response is in turn used as a template to derive a test level specification. The result of this work is a plot (response of Acceleration Spectral Density vs. frequency) of test specification to be used for component random vibration testing.