

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Structures I Design, Development and Verification (Launch Vehicles and Space Vehicles, including
their Mechanical/Thermal/ Fluidic Systems) (1)

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ENHANCING THE NATURAL FREQUENCY OF THAI SPACE CONSORTIUM-1 SATELLITE
(TSC-1) BY PERFORMING AN ANALYSIS OF DIFFERENT STRUCTURAL CONFIGURATIONS
AND MATERIALS

Abstract

During the launch phase, a spacecraft structure is subjected to an extreme dynamic environment. Therefore, the design of a satellite should correspond to the launch vehicle requirements to ensure the satellite's safety. One crucial requirement is that the resonant frequency of the spacecraft needs to exceed the value defined by the launch service provider to prevent coupling with the modes of the launch vehicle. In addition, a spacecraft structure with a high natural frequency is more robust and capable of withstanding greater loads than one with a low natural frequency. This study aims to increase the natural frequency of Thai Space Consortium-1 satellite (TSC-1), a microsatellite developed in Thailand, by applying different configurations and materials to the structure while maintaining its mass to be constant. To achieve the study objective, a few different structural models were generated and simulated to determine their respective natural frequencies by using Computer-Aid Engineering (CAE) software. Then, the model with the highest natural frequency was analyzed by applying the load cases as specified in the requirements. The results are utilized for the optimization of TSC-1 structure and further development in the future.

Keywords: Natural frequency, Satellite structure, TSC-1, Microsatellite