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

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{SPACE STRUCTURES: DEVELOPMENT AND VERIFICATION}

Abstract

In aerospace engineering, structural safety is of utmost importance, especially when developing and constructing satellites. Satellites must be able to endure the harsh conditions of space, such as temperature variations, radiation, and impacts from micrometeorites, while still delivering dependable performance for extended amounts of time. It is crucial to carry out structural verification, which encompasses testing and analysis to establish that the design is capable of withstanding the loads and pressures to which it will be subjected, in order to assure the safety and dependability of satellites. This research paper delves into the design and validation of a MicroSat intended for use in outer space. It deals with a variety of issues related to the construction of the MicroSat, including material choice, static and dynamic stability, damage tolerance, reusability, and other topics under the banner of "Development and Verification of Space Structures". The research conducted also showcases the development of the MicroSat from its designing stage to its verification stage. For these purposes, a variety of software's, such as SOLIDWORKS, ANSYS have been used. In order to ensure that the MicroSat functions as intended, the effects of the harsh space environment, which includes high radiation and extreme temperatures which can significantly impact the performance and reliability of the MicroSat have been taken into consideration. The use of advanced materials and thermal control technology was researched as a viable option to mitigate the effects of these loads. Testing methods, static and dynamic ground testing, ground vibration testing has been conducted on the developed 3D model in the Ansys software simulating its orbital and launching conditions to prove the structural validity of the developed model. This in turn, offers a comprehensive overview of these considerations and highlights the importance of using advanced materials, heat control systems, and precise testing techniques to ensure successful verification of the MicroSat design.