

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Environmental Effects and Spacecraft Protection (6)

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ORBITAL PARAMETERS AND THEIR EFFECTS ON HEAT LOADS OF A SATELLITE

Abstract

In comparison to the earth's surface, the environment in space changes greatly. Temperature and radiation are two major factors that alter dramatically. Extreme temperature changes are experienced by satellites throughout their lifetime, affecting the effective operation of satellite components. Thermal control strategies are required for satellites to operate safely within their operating temperature ranges. Thermal designers must have a fundamental understanding of the space environment to which a satellite may be exposed over its mission period in order to build adequate thermal control designs and select effective thermal control components. The orbital parameters like altitude, beta angle, and inclination angle all play a role in this. The temperature of a satellite with a passive thermal control mechanism is mostly determined by the spacecraft's position and orbit. Using the SINDA and Thermal Desktop software, the effects of these parameters, as well as other factors such as surface properties, satellite spin and orientation, were investigated for a satellite configuration. The satellite under investigation is considered as a cuboid of dimensions similar to a 2U Cubesat with different surface properties. Thermal analysis revealed that temperature variations with altitude do not vary much for the range of altitudes investigated and that the temperature of the satellite is mostly determined by beta angle variation for each height.