

عنوان مقاله:

Effects of Variations in Orbital Parameters on Thermal Behavior of a LEO Satellite

محل انتشار:

اولین کنفرانس بین المللی مهندسی مکانیک و هوافضا (سال: 1395)

تعداد صفحات اصل مقاله: 7

نویسندگان:

a anvari - *Department of Mechanical Engineering, Iranian Research Organization for Science and Technology*
(IROST)

f farhani - *Department of Mechanical Engineering, Iranian Research Organization for Science and Technology*
(IROST)

a.a bitarafan - *Department of Mechanical Engineering, Iranian Research Organization for Science and Technology*
(IROST)

خلاصه مقاله:

Throughout a satellite's mission, the operating temperatures of its components are controlled within safe margins using active or passive thermal control subsystems. Altitude and beta angle are important orbital parameters that affect the satellite temperatures and should be considered in the satellite thermal design process, especially in the early stages of the space program, to decide the type and altitude of the satellite orbit and the beta angle. In this work, the thermal control subsystem of a small cubical LEO satellite (with one of the sides facing the nadir) was considered and effects of the variations in the aforementioned parameters on the satellite temperatures were studied. Two cases were considered: a synchronous LEO satellite, with an almost constant beta angle, and an asynchronous LEO satellite, with variable beta angle. Altitude was changed in the range of 500 to 1000 km. For each case and at every altitude, the environmental heat fluxes, namely solar; albedo and Earth IR, were determined. The external heat fluxes along with view factors from the geometrical modeling (GMM) were then used as inputs to the thermal model (TMM) of the satellite to obtain temperatures of the main components. Subsequently, based on the calculated temperatures at each beta angle, the critical beta angles corresponding to the maximum and minimum temperatures were determined for the range of altitudes considered in this study. The results, discussions and conclusions presented in this paper help thermal engineers design thermal control subsystems for LEO satellites with similar configuration and operating at a similar range of altitudes.

کلمات کلیدی:

Altitude, Beta angle, Environmental heat load, Low Earth Orbit (LEO), Thermal control

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/507085>



