

Thermal Evaluation on Orbit Altitude Change for Low Earth Orbit Satellite

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Basically the design requirements for the thermal control on the satellite are mission orbit, budget for power and mass, cost, temperature margin, and testability in ground. Among those requirements, mission orbit plays critical part. Although nominal orbit altitude is defined for the design baseline, thermal effect from the altitude change should be assessed if the satellite operates in the range of altitude. In this study, effect of orbit altitude change(450~800km) on thermal design is thermally evaluated comparing external heating rate and radiation couplings. Only the hot case is considered and simplified thermal model of satellite is used. The evaluation result shows that the level of external heating is not significantly affected according to altitude change, but, care must be taken if temperature sensitive part is exposed to external environment.

Comparison of Thermal Uncertainty Margins in Thermal Design and Test of Satellite

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Even though thermal models can be developed using large number of nodes and run in fast computers, thermal uncertainty margins should be included in the process of thermal design of satellites. That is because contact conductance, thermal blanket efficiency, and etc. can not be modeled accurately. Although thermal model is correlated with thermal test data, the data is obtained from ground test, not flight test. Therefore, correlated thermal models should also have thermal margins. In this study, thermal uncertainty margins in thermal design and test of satellite is reviewed by comparing the old standard and current practices among the satellite developers.