

The Comparison of the Thermal Orbit Environments for the Different Attitudes of a Satellite with Fixed Solar Arrays during the Eclipse

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A satellite's attitude for the Sun during the daylight is determined by the solar cell side of solar array pointing toward the Sun. In this study, the thermal analysis of a satellite with fixed solar arrays is considered. The solar cell side of solar arrays is at the bottom direction of a satellite, and so the bottom side is always toward the Sun for the daylight. But during the eclipse, the attitude of satellite is not defined. If with the same attitude toward the Sun, which is invisible during the eclipse, the payload part in the top side is toward the deep space. It is expected that excessive heater power would be needed because it does not be benefited by the Earth IR during the eclipse. So, it is considered that the top side of a satellite is toward the Earth, that is nadir-pointing, only during the eclipse. The thermal analysis of a satellite for both attitude in orbit is done to compare the difference of thermal environment and heater power consumptions. The result shows that a nadir-pointing attitude during the eclipse consumes less heater power by a half.