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Thermal Distortion Analysis of the Large Deployable Reflector Using FEM

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Space structures are subjected under various environments in space. One of these environments is severe thermal condition where the difference of temperature during day-time and night-time is about 200 degrees Celsius. A signal level of a radio wave from the LDR (Large Deployable Reflector) mounted on the ETS-VIII (Engineering Test Satellite -VIII), which was launched in 2006, was observed to change during the Earth eclipse. This phenomenon was assumed to be caused by thermal distortion of the LDR. The distortion effect may become a considerable issue when maintaining the accuracy of communication beams reflected by a large space antenna in case of future artificial satellite. From this point of view, a thermal distortion analysis using FEM is carried out on the LDR to find a suitable member composition and a combination of the internal forces to suppress the distortion.

Keywords: Large deployable reflector, Thermal distortion analysis, Finite element method, Space engineering