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THERMAL DESIGN OF DEVELOPABLE RADIAL-RIB ANTENNA WITH HIGH REFLECTOR
PRECISION

Abstract

The Ka-band radial-rib antenna requires very high precision on reflection surface. The accuracy of the antenna with diameter of 4.2m is required to be better than 0.4mm. Furthermore, the thermal deformation of the antenna is the main reason affecting the precision of the antennas. Therefore, the thermal design plays a very important role in these series antenna's design. However, few papers about the thermal design regarding these antennas are reported. In this paper, firstly, the major parts of the antenna are described. Secondly, the thermal deformations of the parts are discussed qualitatively and quantitatively. The parts which have a great effect on thermal deformation can be decided, and the temperature range is determined. Thirdly, the thermal designs of the two parts (radial-rib and developed mechanism) are described in detail. Fourthly, the thermal balance test of the parts is presented to validate the thermal design, and the major thermal parameters are obtained (the effective emissivity of radial-rib-MLI at low temperature, the effective absorptivity and emissivity of metal mesh). Finally, the thermal analysis prediction and flight data on-board are briefly presented here.