

Abstract (paper not available)

Study of Internal Charging and Discharging in Polyimide with Different Impurities and Structures

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Solar Array Drive Mechanism (SADM) is a crucial component of long life and large power satellite. Slip ring is the key electrical transfer subassembly of SADM, which may probably experience deep dielectric charging caused by energetic charged particle irradiation. In order to investigate the effects of geometry and impurity to internal charging and discharging properties of slip ring, this paper present Monte Carlo particle transfer simulation and finite element method to calculate the electric field and potential of slip ring samples. Then, an electron accelerator simulating the worst-case in the Geosynchronous Orbit (GEO) was utilized to carry out 2MeV electron beams irradiation test. The surface voltage and electrostatic discharge were measured and verified to be consistent with model predictions. It is concluded that proper choice of modified Polyimide and design of slip ring would minimize the internal charging and discharging threat to SADM. The results will aid in avoiding or eliminating in-flight electromagnetic problems and serve as guidelines for the design of future SADM for higher reliability and safety?
