15th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Hypervelocity Impacts and Protection (3)

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EXPERIMENTAL INVESTIGATION ON THE DAMAGE CHARACTERISTIC OF SOLAR ARRAY UNDER MILLIMETER SIZE ORBITAL DEBRIS HYPERVELOCITY IMPACT

Abstract

The damage characteristic of solar array under millimeter size orbital debris hypervelocity Impact were carried out by two-stage light gas gun, the impact velocity ranging from 3-7km/s. The mechanical damage equation and the variation of volt-ampere characteristic of solar array were established through analyzing the damage characteristic, damage modes, boundary effect, open-circuit voltage, short-circuit current, and maximum output power. According to the experiments results, the life of the solar array for a given spacecraft was predicated, and the results shows that the millimeter size orbital debris has little effect on the life, unless the whole solar array was short circuit.