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IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Environmental Effects and Spacecraft Protection (6)

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SPACECRAFT PROTECTION AGAINST DEBRIS AND RADIATIONS

Abstract

The environmental factors basically drive the complex structure of a spacecraft and its performances. The various impacts of these effects are mainly on the outer cover (skin), its designing and the control systems. Major concern being the harmful effects caused by orbital debris and meteoroids in the space environment which when collides with the spacecraft gradually degrades its structural properties. From harmful radiations to Atomic Oxygen (AO) till space debris, the history of spacecraft protection from all these causes has not always been sufficiently fulfilled. This paper deals with the various measures or methods to avoid degradation. Space Radiation shielding for long duration for manned space missions as well as for unmanned are required. Further section discusses some operational techniques to protect the spacecraft from space debris and meteoroids which mainly includes its basic structure. The already degraded or redundant shape of the spacecraft would help in protection from debris in space and will retain the performance efficiency levels even after the action of debris material and micro meteoroid impacts. Debris size and its location along with different components of spacecraft need to be analysed to estimate the strength of spacecraft to resist the impact. Various shielding techniques which consist of honeycomb panels, wire bundles and multi layer insulation blankets and others protect the sensitive systems of spacecraft. 3-D simulation CAD design of the spacecraft is presented. This not only protects spacecraft from debris degradation but also from other kinds of failures. Thus, these improved abilities to tackle the degradation caused to spacecraft can be incorporated for reduction of loss. These radiation protective methods will behave as the sunscreen for the spacecraft.