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

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ANALYSIS OF RADIATION ENVIRONMENT AND ITS EFFECT ON SPACECRAFT IN
DIFFERENT ORBITS

Abstract

According to a survey, United States alone has 2124 spacecraft deployed in space distributed as 1344 in LEO, 142 in MEO, 187 in GEO and 451 other spacecraft in orbit. Similarly major space developed countries like Russia, India, China, Japan have numerous satellites in orbit and have many launches every year. Other countries are also building their own satellites and starting new space programs. This has led to thousands of satellites already in orbit and hundreds in developmental stage. Over the past 20 years, on average one to two satellites per year experience a partial or total mission loss directly attr [ibuted to radiation effects on electrical components. This forms a major concern and requires us to better understand the radiation environment the satellites are exposed to and measure the effects on them. Since different layers surround Earth and the radiation environment varies, quantifying its behavior and effects on spacecraft at different altitudes is important. The main objective of the project is to study the space environment and analyze trapped high-energy electrons, high-energy protons, galactic cosmic ray intensity in different orbits such as Low Earth Orbit (LEO), Medium Earth Orbit (MEO), Geo-stationary (GEO) and predict the effect of this radiation environment such as total radiation dose, spacecraft charging and single event upsets (SEU) on the spacecraft and provide a mitigation strategy for the future spacecraft to reduce the effects.