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EVALUATION OF SPACECRAFT SHIELDING CAPABILITIES AGAINST THE CHALLENGES OF THE SPACE RADIATION ENVIRONMENT (CASE STUDY)

Abstract

The harsh space radiation environment in Low Earth Orbit (LEO) poses significant threats to spacecraft's critical systems and electronics due to ionizing and non-ionizing radiation from galactic cosmic rays, solar activity, and Earth's trapped radiation belts. Understanding these effects is crucial for designing effective spacecraft shielding. To contribute to this understanding and optimize future missions, we conducted a study comparing two distinct spacecraft shielding methods for non-radiation-hardened commercial off-the-shelf (COTS) components in LEO. One approach utilizes aluminum, a familiar material commonly used in such missions, as described in our previous work presented at IAC-23. The other approach employs a multilayer shielding material, offering an opportunity to assess its capabilities against the challenges of the harsh space radiation environment. This comparative analysis aims to guide future missions in utilizing COTS components safely and effectively in LEO by providing insights into the strengths and limitations of different shielding approaches.