The JOREM Project: Jupiter Environment, Effects and Shielding Prediction Models for SPENVIS

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Abstract

The Jupiter radiation environment presents unique challenges to spacecraft engineers when designing equipment for the Jovian system due to the intensity and high energy of the trapped electron and proton populations which can induce effects much more severe than encountered in the near-Earth environment. Under the ESA JOREM Project, a consortium comprising QinetiQ, ONERA and DH Consultancy is developing radiation/plasma environment and effects models in order to support the analysis of these effects for future missions to the Jovian system. The developments include:

1. a new trapped particle environment model, JOSE, which is based on all relevant data measured by interplanetary missions during their passage in Jupiter's magnetosphere;

2. a Fortran implementation of the Divine & Garrett plasma model;

3. a new version of the PLANETOCOSMICS code which can simulate the radiation environment at the Galilean moons;

4. an updated version of SHIELDOSE-2 to simulate shielding effects for materials other than Al, and a wider variety of target materials;

5. a shield-design optimisation tool which is based on MULASSIS and a genetic algorithm.

The European Space Agency's SPace ENVironment Information System (SPENVIS) is a Web based interface to a large number of space environment and effects models and tools (http://www.spenvis.oma.be/). The models and tools developed in the JOREM project are being implemented in the SPENVIS framework to permit easy access and use.

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