Abstract *(paper not available)*

New Internal Charging and Plasma Environment Tools for the JUICE Mission

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The Jupiter system presents a very hazardous environment to the future JUICE spacecraft due to both direct ionisation, and internal dielectric charging (IDC) and surface charging. In particular, the paucity of trapped electron measurements and details of the variability of the environment, the very high energies of these electrons, and the lower temperatures within which spacecraft dielectrics will be operating makes it more challenging to extrapolate our understanding of the charging risk, which is based largely on observations in the near-Earth environment. The ESA JUICE Charging Analysis Tools (JCAT) project is developing new models for the low-energy plasma (CPEM) and energetic electron (HPEM) environments relevant to surface and internal charging in the Jupiter system above 9.5Rj. A new deep-dielectric charging simulation tool, MCICT, has also been developed which uses Geant4 Monte Carlo radiation transport to calculate electron propagation and estimate ionisation-induced conductivity effects. Within JCAT, these tools are being used to assess the performance of IDC mitigation strategies for dielectrics such as Kapton and FR4, including the efficacy of shielding using combinations of low- and high-Z materials. This paper will provide an overview of the new JCAT models, their operation within the ESA/BIRA web-based SPENVIS system (including interfaces with existing SPENVIS analysis tools), and present the results and conclusions from comparisons of different IDC mitigation strategies which could be adopted for the JUICE mission.

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