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# Europa's interaction with the jovian plasma from hybrid simulation

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Galilean moons are embedded in Jupiter's giant magnetosphere. The jovian plasma particles interact with the atmosphere of the moons, exchanging momentum and energy, and generate different phenoma such as aurora, electric current, etc.

The exploration of the Galilean moons, and in particular Ganymede and Europa considered as potential habitats, are listed among the main objectives of the ESA JUpiter ICy moon Explorer mission. In preparation of future observations, a simulation effort is conducted to describe the Europa moon-magnetosphere system as well as a study of radio wave propagation in the environments of Ganymede and Europa using a ray tracing code.

LatHyS is a hybrid 3D, multi-species and parallel simulation model which is based on a kinetic description of ions and a fluid description of electrons. The model is based on the CAM-CL algorithm that Alan Matthews[1] outlined in 1994. It allows to describe the interaction between the jovian plasma and the moon environments. As Ganymede's environment has already been implemented, we propose to enrich the model by completing it with Europa's – jovian plasma interaction and to optimize it in order to improve the accuracy of the results.

Artemis-P, developed by Gautier[2] in 2013, is a ray tracing code that calculates the trajectory of waves through a given environment. Planetary environments are anisotropic and inhomogeneous, so that radio waves can undergo refraction, reflection, scattering, diffraction, interference, etc. between the source and the detector. The ray tracing methods allow to treat the refraction and reflection phenomena at large scales compared to the wavelength. The proposed work is to adjust this program to the environments of Ganymede and Europa using data from LatHyS simulations.

Références :

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