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Ganymede-Jupiter's magnetospheric plasma interaction in a hybrid model

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Abstract

Jupiter's moon Ganymede is a unique moon in our Solar System because it has an intrinsic magnetic field. Other intriguing properties of the moon are that it is bigger than Mercury and that it may have an ocean below its icy surface. Ganymede is one of the primary scientific objectives of the planned ESA's Jupiter Ganymede Orbiter (JGO).

In this work we analyze how Jupiter's magnetospheric plasma interaction with Ganymede's magnetic field can be studied by a global numerical model. In the self-consistent quasi-neutral hybrid model ions are modeled as particles while electrons are modeled as a massless, charge neutralizing fluid. The model has earlier been used to simulate how the flowing plasma interacts with Mercury [1], Venus [2], the Moon [3], Mars [4], Saturnian moon Titan [5] and a non-magnetized asteroid [6].

In this work we consider the question of how the hybrid modeling approach may be used to study Ganymede's plasma environment.

References

[1] Kallio, E. and P. Janhunen (2003) Solar wind and magnetospheric ion impact on Mercury's surface, *GRL.*, Vol. 30, No. 17, 1877.

[2] Kallio, E., R. Jarvinen and P. Janhunen (2006) Venus-Solar Wind Interaction: Asymmetries and the Escape of O^+ Ions, *PSS*, Vol. 54, 13-14, 1472–1481.

[3] Kallio, E (2005) Formation of the lunar wake in quasi-neutral hybrid model, *GRL*, VOL. 32, L06107, doi:10.1029/2004GL021989.

[4] Kallio, E. and P. Janhunen (2001) Atmospheric effects of proton precipitation in the Martian atmosphere and its connection to the Mars-solar wind interaction, *JGR*, *106*, 5617-5634.

[5] Kallio, E., I. Sillanpää and P. Janhunen (2004) Titan in subsonic and supersonic flow, *GRL*, Vol. 31, doi:10.1029/2004GL02034.

[6] Kallio. E, P. Wurz, R. Killen, S. McKenna-Lawlor, A. Milillo, A. Mura, S. Massetti, S. Orsini, H. Lammer, P. Janhunen and W-H. Ip (2008) On the impact of multiply charged heavy solar wind ions on the surface of Mercury, the Moon and Ceres, *PSS*, 7 Vol. 56, 11, 1506-1516.