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Global hybrid simulations of the magnetosphere of Mercury

Riku Jarvinen (1,2), Markku Alho (1), Esa Kallio (1), and Tuija I. Pulkkinen (1)

(1) Aalto University, School of Electrical Engineering, Department of Electronics and Nanoengineering, Espoo, Finland (riku.jarvinen@aalto.fi), (2) Finnish Meterorological Institute, Helsinki, Finland

We present results from a 3-dimensional global hybrid modeling study of the solar wind interaction with Mercury. First we discuss the implementation of the numerical simulation model, where ions are treated as particles moving under the Lorentz force and electrons are a charge-neutralizing fluid. In the hybrid approach ion dynamics are self-consistently coupled with the propagation of the magnetic field by Faraday's law. The undisturbed solar wind flow is injected from the front wall of the simulation domain and the particles can reach the planetary surface, which is the inner boundary. Resistivity profiles of the planetary crust and core can be included as well. The incident solar wind can include, for example, conditions during stationary nominal and high-speed streams and solar wind transient conditions like interplanetary coronal mass ejections. In the second part of the study, we analyze the interaction of the solar wind with the Hermean magnetic field including the formation of the bow shock, the magnetosheath and the magnetopause. In the analysis we concentrate on how the solar wind plasma gains access to different regions in Mercury's magnetosphere and its boundary layers.