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The surface conductivity effects on the structure of Mercury's magnetosphere: a 3D hybrid simulation study

Yung-Ching Wang (1), Wing-Huen Ip (1,2), Joachim Mueller (3), Uwe Motschmann (3,4)

(1) Institute of Astronomy, National Central University, Jhongli, Taiwan (m949001@astro.ncu.edu.tw), (2) Institute of Space Science, National Central University, Jhongli, Taiwan, (3) Institut fuer Theoretische Physik, der Technischen Universitaet Braunschweig, Germany, (4) DLR Institut fuer Planetenforschung, Berlin, Germany

Mercury's magnetosphere is a poor known system which couples directly to the surface but is hardly affected by the tenuous ionosphere. As a terrestrial moon-like body, the closure of the field-aligned currents (FACs) remains a critical issue for the study of the magnetosphere. We performed a 3D hybrid model to simulate the Hermean system without injecting any planetary ions and treated the surface of Mercury with small resisitivity (10^{-3} S/m) and large resistivity (10^{-7} S/m) for comparison. While the surface conductivity has equivalent functions as a substantial ionosphere, the magnetosphere could be taken as a mini-size of Earth-like structure. However, as the surface resistivity increases to avoid the FACs from completion, the plasma flow would be modified as a feedback. The plasma environment and the magnetic distribution around Mercury were examined and the effect of the surface conductivity on the morphology of Mercury's magnetosphere could be acquainted more closely through the inspection.