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Self consistent hybrid simulation of Mercury 's plasma environment

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Like Earth, Mercury possesses a highly conducting core. For this reason, magnetospheric dynamics in the vicinity of the planet are strongly affected by the fields that are induced in the planetary core. Within the framework of the present study, the interaction between a conducting planet with the solar wind has been analysed by using a three dimensional Hybrid code. This model treats the electrons as a fluid, whereas a completely kinetic approach is retained to cover ion dynamics. Unlike any other available model the code computes the current system in the planetary core and realizes a self consistent coupling between the conducting core and the adjacent solar wind. The simulations show, that the induced currents give rise to a shock front at the obstacles ram side while a complex electromagnetic field topology is formed in the planetary wake. The validity of the model is proved by comparison to data from space-craft missions.