

Interaction between solar wind and mini-magnetosphere of dipolar magnetized objects

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Interaction between solar wind and mini-magnetosphere of dipolar magnetized objects is investigated by electromagnetic hybrid simulation. The study is important for not only understanding of the physical interaction processes for magnetized asteroids but also evaluation of the magnetic sail propulsion which uses a static artificial magnetic field to deflect solar wind. A physical parameter which characterizes the mini-magnetosphere is a distance, in units of ion inertial length, ahead of the object where the dipole magnetic field pressure balances the solar wind ram pressure. While the distance is much smaller than unit, the interaction is very weak and changes in solar wind velocity and density is negligible. On the other hand, the distance becomes larger (about 640 for Earth), it will approach an earth-like magnetosphere. We develop a three dimensional hybrid code and investigate physical structures of the mini-magnetosphere and evaluate the magnetic sail propulsion in the quasi-steady state.