

Ion scale magnetospheres of small magnetized celestial bodies

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The interactions between high speed plasma flows and magnetized celestial bodies generate various magnetospheres. In this study, the ion scale magnetospheres of small magnetized objects with a magnetic dipole moment in the solar wind are investigated by a three-dimensional hybrid simulation, which treats the ions as kinetic super particles via particle-in-cell method and the electrons as a massless fluid. The ion scale magnetospheres are that their sizes are not less than a few and not more than a hundred times ion gyroradius of the solar wind proton in the magnetic field strength at the subsolar magnetopause boundary. Their macroscopic structures look similar to magnetohydrodynamics scale ones. However, the structures of their bow shock, dayside sheath and magnetopause boundary layer are comparable to the ion kinetic scale and mutually influence each other through ion kinetic effects. We will discuss the plasma convections, current flows, and field structures in various solar wind conditions.