

Plasma Flows Observed Inside the Morningside Magnetopause during Transient Magnetopause Crossings

K.-H. Kim, N. Lin, C. Cattell

School of Physics and Astronomy, Univ. of Minnesota

We have examined enhanced plasma flows inside the morningside magnetopause during the interval of the southward magnetosheath magnetic field. Enhanced plasma flows have been frequently observed inside the magnetopause when the Geotail satellite briefly entered the magnetosheath. Such flow motions were mainly in the MN plane of the LMN coordinates. The enhanced flows showed a bipolar signature (i.e., inward flow before the outbound magnetopause crossing and then outward flow after the inbound magnetopause crossing) in the component normal to the nominal magnetopause. We found two different types of the bipolar flow: one is roughly symmetric with respect to the center of the event (that is, the negative and positive peak amplitudes are comparable.) and the other is strongly asymmetric (that is, the outward flow speed is much larger than the inward flow speed.). Using a simple qualitative model, we show that the symmetric bipolar flow is interpreted as a result of a vortical plasma motion from the ExB drift. The source of the electric field E may be associated with briefly compressed magnetopause moving tailward, which is induced by transient external (solar wind/foreshock) pressure pulse. In the asymmetric case, the strong outward flows were accompanied by a depressed magnetic field strength. These outward flows may be associated with rapid outward magnetopause motion due to expansion of the magnetosphere perturbed by external pressure variations.