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Magnetic Structure of the Magnetopause Boundary Layer for Open Magnetosphere

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Using Cluster and Magnetospheric MultiScale (MMS) spacecraft 4 point magnetic field measurements, we analyzed the magnetic structure of magnetopause boundary layer of the open magnetosphere. It is indicated that the magnetopause boundary layer is very thin under strong magnetic shear and the thickness is usually $\sim$ 0.1 Re. We found that the Rotational Discontinuity (RD) is very important structure at magnetopause when the Interplanetary Magnetic Field (IMF) is southward. Within the boundary layer, the magnetic field has a large rotation. Using curvature calculation method, we got that the minimum curvature radius of magnetic field of RD is $\sim$ 0.02 - 0.1Re, implying that the magnetosphere is open when the IMF is southward. Advanced research showed that the field-aligned currents are common in the magnetopause boundary layer.