

Dynamics of the inner magnetosphere during magnetic storms

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A key process in magnetic storms is formation of ring current, and the center of the ring current is estimated to be at radial distances of 2-5 R_E . Magnetic field observations with spacecraft at and around geosynchronous altitude, however, indicate the formation of the disk-like thin current sheet in the equatorial plane with its edge beyond geosynchronous altitude. Observations with the spacecraft Geotail support the view that the ring current is connected with the intensified cross-tail current in the plasma sheet beyond 10 R_E . Particle dynamics is essentially coupled with magnetic field dynamics in the inner magnetosphere. In most of past studies, the static and quasi-static field model is assumed in understanding particle dynamics. Particle observations are usually interpreted on the basis of the static magnetic field model. Particle dynamics is coupled with magnetic field dynamics, and particle behaviors alter the magnetic field configuration itself. A comprehensive study for particle dynamics in self-consistent magnetic and electric fields is essential for our understanding of magnetic storms.