Energy density changes near plasma sheet inner edge during substorm

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The radial gradient of the magnetospheric plasma pressure along the midnight meridian is clearly evident from the observations by many different spacecrafts. In the "transition" region between 5 and 12 Re the pressure changes very sharply. Tailward of this region, on r > 10-12 Re whihin the plasma sheet, during the substorm the ion pressure increases with the injection and the magnetic pressure decreases. In addition, the increase in the plasma pressure is nearly balanced by the decrease in the magnetic field pressure with a small change in the total pressure [Kistler et al, 1992].

Using data from the CRRES spacecraft we investigated the injections of energetic ions > 37 keV and energetic electrons >21.5 keV and the local dipolarization of the magnetic field during substorms in the vicinity of the magnetic equatorial plane on r~6 Re in the near-midnight sector. In considered events, the depression of magnetic field and injection of energetic ions are observed just prior to the local dipolarization. We estimated the diamagnetic effect of particles, the total energy density (of particles and magnetic field), and the magnetic field of distant currents except diamagnetic component. We present some characteristics of the time development of the energy density of particles and magnetic field during the local dipolarization. This coupling between the magnetic field variations and the pressure changes in the localized region of space is important for understanding the physics of the substorm inself and her expansion.

The work is supported by grant RFBR-01-05-64827-a.