

The spacial distribution and temporal variation of the total pressure in the distant magnetotail

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The magnetosphere is compressible and the pressure inside it is variable. The total pressure depends on the distance from the earth and also the solar wind condition. In the steady state the pressure in the tail lobe balances with that in the plasma sheet. In some recent works using GEOTAIL data (Petrukovich et al., 1999, Matsumoto et al. 2001) the pressure balance is found to be sometimes broken associated with the passage of plasmoids. In order to study the dynamics of the magnetosphere, it is important to know the spacial distribution and temporal variation of the pressure.

Fairfield and Jones [1996] showed that the strength of the lobe field decreases with the distance from the earth, and temporally changes depending on the dynamic pressure of the solar wind and the interplanetary field.

We statistically analysed the total pressure measured by GEOTAIL in the distance between 40 and 220 Re, and fitted it to a equation similar to that given by Fairfield and Jones. We obtained new coefficients, although we found that the description of Fairfield and Jones was also quite available in the distant tail.

Moreover we studied the difference between the measured pressure and predicted one from our new equation. We found that the measured pressure is always smaller than the predicted one when the plasma flow is earthward. It is quite consistent with the feature found by Petrukovich et al. [1999], in which the pressure depress after the passage of plasmoid.