昼間側Magnetopause電流層の厚さの推定と電流層理論モデルとの比較

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Estimation of the thickness of the dayside magnetopause current layer and comparison with the theoretical magnetopause current layer model

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The study of the structure of the magnetopause is of
fundamental importance in understanding the microphysical
processes involved in the solar wind interaction with the
magnetosphere. The thickness of dayside magnetopause
current layer is one of the important key parameters in
this study.
Then, using the magnetic field and plasma moment data,
we have examined the thickness of dayside magnetopause
current layer in the LMN coordinate.
During about two years from February 1994 to December 1995,
though about 350 events that the GEOTAIL spacecraft crossed
the dayside magnetopause were collected, only EA-mode data
that were confirmed from the ion distribution function were analyzed
in this study. To estimate the thickness of the magnetopause current layer,
we have used the method that Sergeev et al [1998] proposed for
the estimation of the thickness of the plasma sheet in the magnetotail
with a flapping motion. As this result, the thickness of
the magnetopause boundary by using this method concentrated
at 100 - 300 [km]. Compared with previous works using the other
techniques for estimation of the magnetopause current layer,
our thickness was thinner than previous results.
Thus, to confirm whether our result appropriates or not, we have compared
our thickness with the thickness calculated by the theoretical simple
magnetopause current layer model (Ferraro - Rosenbulth model).
In this theoretical calculation, as the parameters to calculate
the ion and electron gyroradius, we used the value of magnetic filed
in the boundary just between the magnetopause and magnetosheath.
An ion to electron temperature ratio of 9 was given
(Okuda [1992], Berchem and Okuda [1990]).
By examining the ion distribution function, the ion velocity
perpendicular to the magnetic field was chosen either the
plasma bulk or thermal velocity. While the electron velocity
perpendicular to the magnetic field was used only thermal velocity
to calculate the electron gyroradius. In this meeting, we will discuss
about the comparison between our thickness and the theoretically
calculated result in detail.