Variation of the Tail Current Sheet Thickness under the Northward IMF Condition

Masaki Nishino[1], Toshio Terasawa[2], Masahiro Hoshino[3]

[1] Earth and Planetary Phys., Tokyo Univ., [2] Dept. Earth Planetary Sci., Univ. of Tokyo, [3] Earth and Planetary Phys., Univ of Tokyo

We have analyzed the structure of the magnetotail current sheet using the method devised by Sergeev et al. [1998]. Case studies suggest that there are at least two different occasions for a significant thinning of the current sheet depending on the north-south polarity of the interplanetary magnetic field (IMF): (1) during a growth phase of a substorm when the IMF is southward, and (2) during a building-up phase of the cold dense plasma sheet when the IMF is northward. It is further found that during the second category of the events, the plasma `vertical content', namely the product NiL with the plasma density Ni at the plasma sheet center and the characteristic thickness L, showed an order-of-magnitude increase within 4 hours.

We have analyzed the structure of the magnetotail current sheet using the method devised by Sergeev et al. [1998]. Case studies suggest that there are at least two different occasions for a significant thinning of the current sheet depending on the north-south polarity of the interplanetary magnetic field (IMF): (1) during a growth phase of a substorm when the IMF is southward, and (2) during a building-up phase of the cold dense plasma sheet when the IMF is northward. It is further found that during the second category of the events, the plasma `vertical content', namely the product NiL with the plasma density Ni at the plasma sheet center and the characteristic thickness L, showed an order-of-magnitude increase within 4 hours. We estimate plasma transport rate during the northward IMF (N-IMF) to be 10^{26}/sec, which can not be neglected in comparison with that during the southward IMF (10^{27}/sec).