

Estimation of electron number density in the near tail regions using the Geotail spacecraft potential

Mariko Terashita[1]; Keigo Ishisaka[2]; Taketoshi Miyake[3]; Toshimi Okada[4]; Yasumasa Kasaba[5]; Hajime Hayakawa[6]; Hiroshi Matsumoto[7]; Toshifumi Mukai[6]

[1] Elec.and Info.Eng.,Toyama Pref.Univ.; [2] Electronics and Informatics, Toyama Pref. Univ.; [3] Elec. and Inf., Eng., Toyama Pref. Univ.; [4] Electronics and Infomatics,Toyama Pref Univ; [5] JAXA/ISAS; [6] ISAS/JAXA; [7] RASC, Kyoto Univ.

We have investigated the relationship between the Geotail spacecraft potential and the electron number density and electron temperature in the near tail regions during the period from November 1994 to March 1997, and improved the empirical formula considering the electron temperature. Consequently, we can estimate the electron number density in the solar wind and the magnetosphere including the near tail region using the spacecraft potential and electron temperature measured by the low energy particle instrument onboard Geotail spacecraft. The amount of scatter of the measured value from the improved empirical formula is about +/-20%. We can obtain the electron number density by using the spacecraft potential and a modified empirical formula, when we cannot see the characteristic frequency of plasma waves. Then we apply the improved empirical formula to the spacecraft potential measured by Geotail spacecraft adding the characteristic of ambient plasma effect, and obtain the spatial distribution of the electron number density for the electron temperature in the solar wind, the magnetosheath and the magnetosphere including the near tail regions. We discuss on the distribution of electron number densities in the magnetosphere under the different solar wind conditions, the electron temperature and the magnetic fields.