

衛星電位および電子温度を用いた電子密度推定

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Estimation of electron density using spacecraft potential and electron temperature

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We have investigated the relationship between the Geotail spacecraft potential and the electron number density/temperature in the near tail regions during the period from November 1994 to March 1997, and improved the empirical formula considering the electron temperature. 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%. But there are some cases that the electron density obtained by the empirical formula does not corresponded with the electron density estimated the plasma wave spectrum in the solar wind and the boundary layer between solar wind and magnetosphere. This is caused by using the empirical formula to obtain the electron density. It is necessary to discuss theoretically the relation among the spacecraft potential, the electron density and the electron temperature and to establish a method of estimation of electron density using the spacecraft potential. If the electron density can be obtained theoretically by the spacecraft potential, the estimation of electron density by the spacecraft potential can be applied to the future mission to magnetosphere and planet.

In this presentation, we will discuss the theory of spacecraft potential in the space plasma environment and show the formula in order to obtain the electron density by the spacecraft potential. And we will present about an automatic decision method of observation region onboard spacecraft in the future missions using the spacecraft potential, plasma wave spectrum, magnetic fields and plasma density/temperature.