

Identification method of MHD waves in inhomogeneous magnetic fields

Miho Saito[1]; Yukinaga Miyashita[2]; Masaki Fujimoto[3]; Iku Shinohara[4]; Yoshifumi Saito[5]; Toshifumi Mukai[6]
 [1] Earth and Planetary Sci, Tokyo Univ; [2] ISAS/JAXA; [3] ISAS, JAXA; [4] JAXA/ISAS; [5] ISAS; [6] JAXA

On the basis of the linear MHD theory, we have developed a method for estimating characteristics of the low-frequency (smaller than the ion cyclotron frequency) fluctuations in the plasma sheet from data of the three components of the magnetic field and the ion velocity. Propagating modes can satisfy the relationship between fluctuations of the magnetic field and the ion velocity, so that fitting observed fluctuations into this relationship will give the phase velocity vector. Since we take into account an inhomogeneous ambient magnetic field, which is the case in the equatorial plasma sheet, we can estimate the sum of the magnetic field line curvature and the gradient of the ambient magnetic field. A significant new feature of this method is that the perpendicular wave vector can be estimated to distinguish between the slow magnetosonic mode and the shear Alfvén mode in the high-beta plasma. We applied the method to low-frequency fluctuations prior to a dipolarization in the near-Earth plasma sheet. In this case, the method was applicable, since the amplitude of the fluctuations was small, compared to the ambient magnetic field intensity. We suggest that the method developed here can be applied to other low-frequency phenomena in the plasma sheet.

