

Ideal MHD stability of the geomagnetic tail

Akira Miura[1]

[1] Earth and Planetary Science, Tokyo Univ

The investigation of the MHD stability of the geomagnetic tail is important in understanding magnetospheric activities such as magnetospheric substorms. A static equilibrium plasma configuration in the geomagnetic tail is subject to ideal MHD instabilities such as ballooning and interchange modes. Although both instabilities are pressure driven instabilities and often confused, they have their own distinct characteristics. Based on the energy principle it is shown that the minimization condition of the potential energy for the two-dimensional static tail configuration predicts that two instability modes are possible. Ballooning mode is characterized by incompressible perturbation and survives in the high-beta region. Although the magnetic tension force usually inhibits the growth of ballooning mode in the tail, the tail becomes subject to ballooning mode when the tail becomes more tail-like and the equatorial plasma beta exceeds a critical beta value.