

On the stress balance for the generation of the slow MHD waves

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We have presented that the plasma fluid, in the wide region of the tail plasma sheet, clearly exhibit the diamagnetic properties (anti-phase variations between the plasma pressure and the magnetic pressure) both in the short-timescale disturbance (with the period of ~40-150s: hereafter magnetotail Pi2) and in the longer-timescale disturbances.

Using the magnetic field and the low-energy particle data measured by MGF and LEP instrument on board the Geotail satellite, we have already reported that the substance of the magnetotail Pi2 is the slow MHD wave and the nature of longer-timescale disturbances is termed the slow MHD disturbances.

Of particular importance is the force balance that constitutes the basis for the diamagnetic processes.

There are various force terms describing the momentum balance equation: $\mathbf{J} \times \mathbf{B}$ force, momentum flux, thermal pressure gradient, inertia force, and dynamic pressure.

Considering their relative importance, their contribution to the total force balance, and their time changes, we will discuss the possible mechanism for the generation and evolution of the slow MHD waves.