Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

PEM027-07 Room:103 Time:May 25 18:00-18:15

Characteristics of fast plasma flows in the near-earth plasma sheet

Aoi Nakamizo[1*], Shinichi Ohtani[2], Yukinaga Miyashita[1], Takashi Kikuchi[1]

[1]STEL, [2]The Johns Hopkins University Applied Phy

The Bubble model or the interchange motion of the plasma depleted flux tube, which is originally proposed to solve the so-called 'Pressure Balance Inconsistency', is one of the accepted candidates of the mechanism for high-speed flows observed in the near-earth plasma sheet. However it is not clear yet that it is quite so, and eventually how they are associated with (play a role in) the magnetospheric convection and substorm dynamics.

This study addresses the above problem by investigating the characteristics of fast flows in the central plasma sheet observed by Geotail. We use plasma moments and magnetic field data acquired respectively with LEP and MGF instruments during January 1993 to November 2005. We also include EPIC/STICS data for the derivation of plasma moments. By classifying the fast flow events according to the flow direction (earthward or tailward), flow speed, and distance from the earth, we examined the variations of physical quantities that will show the systematic change if the fast flow was a passage of 'Bubble.' The quantities include the ion pressure (P), north-south component of the magnetic field (Bz), and value equivalent to the specific entropy (PV^gamma, where V is the volume of the flux tube, but here we use Bz as an alternative).

As for the earthward flows, summing up the analysis results, we can conclude that the earthward flows can be basically interpreted as the passage of Bubbles. In addition, it is found for the first time that the speed range in which the Bubble-like features prominently appear shifts to the relatively lower-speed (<400km/s) range in the region closer to the earth(|x|<15Re). This result not only indicates the flow breaking but also suggests that we should reconsider the categorical criteria for the selection of fast flows used in statistical studies. As for the tailward flows, we will discuss their characteristics in association with possibilities, such as bounces of bubbles, vortex-like flows, and the ballooning instability.