LOW FREQUENCY WAVES ASSOCIATED WITH PSBL ION BEAMS. CLUSTER OBSERVATIONS.

E.E. Grigorenko [1], T.M. Burinskaya [1], J.-A. Sauvaud [2] and L.M. Zelenyi [1]

[1] *Space Research Institute of RAS, Moscow, Russia,* [2] *CESR, Toulouse, France*

The processes of non-adiabatic ion acceleration occurring in the Current Sheet of the Earth's magnetotail produce highly accelerated (up to 2500km/s) field-aligned ion beams (beamlets) with transient appearance streaming earthward in the Plasma Sheet Boundary Layer (PSBL). Multipoint Cluster observations have led to a new understanding of these phenomena with a spatial rather than a temporal structure. Comparison of data from different Cluster spacecraft allows to evaluate the duration of beamlets to be, at least, 5-15 min and confirms their well-defined localization along Y and/or Z directions, i.e. across the lobe magnetic field. Earlier results reporting shorter duration of beamlet observations could be understood by the invoking of an additional effect revealed by Cluster: earthward propagation of magnetic perturbations along the beamlet filaments. Phase velocity of these perturbations is of the order of the local Alfven velocity ($V \sim 600 - 1000$ km/s) and related fast flappings of localized beamlet structures in Y-Z direction significantly decreases the time of their observation at a given spacecraft. Statistical studies of 90 beamlets have shown that the typical wave length of the related disturbances is about tens RE and typical period is about several minutes. Such Alfvenic-type disturbances may be caused by Kelvin-Helmholtz instability triggered by a flow shear between the high-velocity plasma beam streaming at the PSBL boundary and the slowly moving plasma of the outer lobe. Our analysis revealed that for the majority of accelerated ion beams observed in the PSBL of magnetotail the conditions for the development of Kelvin-Helmholtz instability are satisfied.
This work was supported by RFBR grants 07-02-00319; 06-02-72561