



Wave Particle Interactions Associated with Cluster Observations of Velocity Dispersed Ion Structures

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Cluster observations of the high latitude near-Earth plasma sheet show well defined velocity dispersed ion structures. They are associated with ion shell plasma distributions and are coincident with electrostatic and electromagnetic wave emissions. Shell distributions have a constant drift velocity in both the parallel and transverse directions, as opposed to a ring distribution, which has a drift only in the perpendicular direction. We have examined wave particle interactions that result from ion shell distributions like those observed by Cluster. We used a magnetized 2-1/2D electrostatic particle in cell (PIC) code with full dynamics ions for both the energetic shell and cold background, and guiding center electrons with full parallel dynamics. Results from the numerical simulations indicate that a combination of lower hybrid waves and ion Bernstein modes are excited accompanied by electron energy gain parallel to the ambient magnetic field as well as cold ion heating in both the parallel and transverse directions. The shell distribution tends to isotropize in velocity space due to the wave-particle interactions. We are in the process of examining electromagnetic emissions driven by the shell distribution using an electromagnetic PIC code and also will use observed distribution functions from Cluster to drive the simulations. Simulation results will be compared with relevant Cluster particle and wave observations.