Geophysical Research Abstracts
Vol. 14, EGU2012-4417, 2012
EGU General Assembly 2012

Transverse instability and magnetic structures associated with electron phase space holes

M. Wu and Q. Lu

University of Science and Technology of China, Department of Geophysics and Planetary Science, Hefei, China (wumy@mail.ustc.edu.cn)

Electron phase space holes (electron holes) are found to be unstable to the transverse instability. In this Letter, two-dimensional (2D) electromagnetic particle-in-cell (PIC) simulations are performed to investigate the structures of the fluctuating magnetic field associated with electron holes. The combined actions between the transverse instability and the stabilization by the background magnetic field (B0=B0ex) lead a one-dimensional (1D) electron hole into several 2D electron holes which are isolated in both the x and y directions. The electrons in these 2D electron holes suffer the electric field drift VE=E$\times$B0/B02 due to the existence of Ey, which generates the currents along the z direction. Then, the unipolar and bipolar structures are formed for the parallel cut of the fluctuating magnetic field along the x and y directions, respectively. At the same time, these 2D electron holes move along the x direction, and the unipolar structures are formed for the parallel cut of the fluctuating magnetic field along the z direction.