Geophysical Research Abstracts
Vol. 12, EGU2010-13198, 2010
EGU General Assembly 2010

The study of electron holes in the process of guide-field reconnection: simulation with realistic parameters.

S. Markidis (1), G. Lapenta (2), Andrey Divin (2), M. V. Goldman (3), and D. L. Newman (3)

(1) Nuclear, Plasma, and Radiological Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, United States, (2) Katholieke Universiteit Leuven, Departement Wiskunde, Centrum voor Plasma Astrofysica, Leuven, Belgium (andrey.div@gmail.com), (3) Center for Integrated Plasma Studies, University of Colorado, Boulder, CO, United States

Particle-in-Cell simulations of guide-field magnetic reconnection are performed. Such common features of guide-field magnetic reconnection, like asymmetric outflow configuration and fast electron jets are reproduced. We focus our study on the kinetic properties of the separatrix region. The study of the force balance is presented. As the separatrix electron jet lines up with the density cavity, complicated multiscale structure arises there. Electron distribution functions show bi-Maxwellian behavior. Fast electron flows turn favorable for the development of electrostatic electron-electron streaming and ion-electron Buneman-like instabilities. In agreement with the other studies [*Pritchett*, 2004], [*Goldman*, 2008], electrostatic structures are generated there, which represent the nonlinear stage of that instabilities. The size of these structures is of the order of electron inertial length d_e and thus is larger than Debye-length solitary waves observed by [*Cattell*, 2002]. In our simulations we use the implicit solver capable of realistic m_i/m_e ratios (up to 1836) and the result is verified for a wide range of physical parameters.