Geophysical Research Abstracts
Vol. 17, EGU2015-12860, 2015
EGU General Assembly 2015

Electromagnetic fluctuations due to electron shear flow instabilities in collisionless magnetic reconnection

Neeraj Jain (1,2) and Joerg Buechner (1,2)

(1) Max Planck Institute for Solar System Research, Goettingen, Germany (jain@mps.mpg.de), (2) Max Planck Princeton Center for Plasma Physics

In Collision-less magnetic reconnection electron scale current sheets (thickness $\sim d_e = c/\omega_{pe}$) develop embedded inside an ion scale current sheet (thickness $\sim d_i = c/\omega_{pi}$).These electron current sheets (ECS) are susceptible to electron shear flow instabilities (ESFI). The ESFI can grow both as tearing, which forms electron scale magnetic islands, and non-tearing modes which may cause filamentation of the ECS. Usually experiments do not capture the growth phase of an instability. However they do record electromagnetic fluctuations, such as in VINETA-II and Magnetic Reconnection Experiment (MRX), possibly resulting from the non-linearly saturated state of the instabilities. We study electromagnetic fluctuations in non-linearly saturated state of ESFIs. An electron-magnetohydrodynamic model is used for the 2-D and 3-D nonlinear simulations of ESFI. The 2-D simulations are carried out in two mutually perpendicular planes: (1) plane perpendicular to the equilibrium electron current and (2) plane containing the directions of equilibrium current and shear in it. Such 2-D simulations will help us isolating the fluctuations caused by tearing and non-tearing modes. The effect of current sheet thickness and guide field will be investigated.