

MAGNETIC STRUCTURES IN THE ELECTRON-SCALE RECONNECTION DOMAIN.

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Magnetic reconnection process, which modifies the global configuration of magnetic fields is driven by large scale current inhomogeneities, while its rate is determined by kinetic, small-scale deformation when particles decouple from the magnetic field. Magnetospheric observations on board Polar, Cluster and Themis suite of satellites indicate that (a) most of magnetosheath reconnection crossings exhibit structures which are inherently spatially non-symmetric with densities and magnetic field differing substantially on both sides of the region, (b) inhomogeneous magnetic and electric field structures consist of narrow, electron diffusion regions with bifurcated current covering width size of electron skin depth or below. The electron-MHD model, which includes the full dynamics of the electrons with stationary ions, density gradients and asymptotically different values of the magnetic field is implemented for the experimentally observed configurations. The resulting linearized three dimensional magnetic vector field eigenvectors are solved as a function of the inhomogeneity coordinate, with inclusion of compressibility, density gradients and thermal effects. The growth rates, which depend also on the scale of the initial configuration, on the perpendicular wavelength and the orientation of the asymptotic fields, determine the most probable final configuration.