Geophysical Research Abstracts
Vol. 12, EGU2010-7091, 2010
EGU General Assembly 2010

Instability Interplay at the Low Latitude Magnetopause: Pairing and Decay of Large-Scale Vortices

Matteo Faganello (1), Anna Tenerani (1), Francesco Pegoraro (2), and Francesco Califano (2)
(1) LPP, Ecole Polytechnique, Palaiseau, France (matteo.faganello@lpp.polytechnique.fr), (2) University of Pisa, Pisa, Italy

Kelvin-Helmholtz vortices provides an efficient mechanism for the formation of a mixing layer along the flank Magnetopause at low latitude. The transport properties of these vortices depend on the interplay between their large-scale evolution and the development of secondary, small-scale instabilities inside the vortices. In particular density inhomogeneities, centrifugal acceleration and plasma current inhomogeneities, created by the vortex motion, drive local Rayleigh-Taylor and Magnetic Reconnection instabilities. The interplay between the large-scale vortex evolution and these secondary instabilities in a magnetized inhomogeneous plasma with a sheared velocity field is investigated within the framework of a two-dimensional, two fluid model. It is found that the combined role of the density inhomogeneity and of the in-plane magnetic field during the development of the Kelvin Helmholtz vortices is multi faceted. It leads to small scale density bubbles and magnetic islands through the development of Rayleigh-Taylor instability and induced magnetic reconnection but, at the same time, the in-plane magnetic field preserves the global coherence of the vortex merging process.