



Numerical evidence of undriven, fast reconnection in solar wind interaction with the earth magnetosphere: formation of electromagnetic coherent structures

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We give evidence for the first time the onset of *undriven* fast, collisionless magnetic reconnection during the evolution of a homogeneous magnetic field advected in a sheared velocity field. Starting from a model of the interaction of the solar wind with the magnetospheric plasma at low latitude, spontaneous reconnection takes place in the shared magnetic layer between successive vortices generated by the Kelvin - Helmholtz instability. The process leads to the generation of coherent magnetic structures (or magnetic islands) of typical size comparable to the ion inertial scale, much smaller than the system dimension, but much larger than the electron inertial scale. The magnetic structures are further advected in the plasma by the velocity field in a complex way, but remain stable on a time much longer than their formation time. These results can be crucial for the interpretation of satellite data showing coherent magnetic structures in many region of the terrestrial environment, as for example the magnetosheet or the magnetotail.