# Magnetic Reconnection induced by Kelvin-Helmholtz Instability

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Magnetic reconnection plays an important role in energy transfer of the solar wind into the magnetosphere, especially when the interplanetary magnetic field (IMF) has a southward component. Frequently observed flux transfer events may be the manifestation of such magnetic reconnection phenomena. Magnetic reconnection may be caused in several distinct situations. In the tearing mode instability magnetic reconnection is generated spontaneously in the current sheet. In the driven reconnection model plasma flows are perpendicular to the sheared magnetic field lines. Recently, Liu and Hu suggested that local reconnection might be caused by vortices which arise from the Kelvin Helmholtz (KH) instability. They noted that, in the dayside magnetopause region where both the magnetic field and the flow field shear exist, large scale fluid vortices can cause magnetic islands and neutral points. They also noted that the nightside magnetopause is susceptible to local magnetic reconnection. When the earth's magnetosphere is located in the positive sector of the IMF, the direction of the IMF is opposite to the earth's magnetic field in the northern hemisphere and there arises a magnetic field and velocity shear in this region. Similar situation occurs in the southern hemisphere when the magnetosphere is located in the negative sector of the IMF. Simulation studies regarding magnetic reconnection associated with the KH instability have also been reported. The main results of these studies are that the evolution of the instability strongly depends on the Alfven Mach number and that it depends only weakly on the magnetic Reynolds number. These studies were done using the incompressible magnetohydrodynamic (MHD) equations and the dependence on the sonic Mach number was never investigated. On the other hand, it is well known that the velocity jump should be smaller than the fast magnetosonic speed for the KH instability to grow. In the present study simulation results in the compressible MHD scope are reported. It is demonstrated that the growth rate of magnetic reconnection does depend on the sonic Mach number as well as the Alfven Mach number.