

# **Rapid Onset of Magnetic Reconnection and the effect of guide field by computer simulations**

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The issue of reconnection onset remains a challenge to the plasma physics community. For most physical systems of interest, reconnection does not proceed in steady manner, but rather there are periods of time in which magnetic flux is accumulated, followed by other periods in which the energy is rapidly dissipated. In this paper we study the onset problem by considering the role of current aligned plasma instabilities such as the lower-hybrid drift instability (LHDI) by full 2 and 3 dimensional particle simulations. It is found that the nonlinear development of the LHDI leads to a variety of nonlinear modifications which can promote reconnection onset even in complex magnetic configurations such as the Earth's magnetotail. With the addition of a guide field several major changes occur. It is shown that the smallest guide field could have large impacts on what systems will exhibit turbulence associated with reconnection. Computer simulation results are compared with observations.