



Kinetic Study of Asymmetric Magnetic Reconnection

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Physical configurations in space are such that different density and magnetic field strengths may be present on both parts of the reconnection site: dayside magnetopause and asymmetric magnetic breakout for CMEs. We present 2D-3V fully kinetic (electrons and ions) and fully electromagnetic simulations of such asymmetric magnetic reconnection, using the iPIC3D code (used in 2D-3V) [1]. Such a kinetic description enables to self-consistently describe the dissipation region substructure of collisionless reconnection, in particular the particle kinetic effects: plasma instabilities, production of energetic particles. The evolution of the proton and electron distribution functions is described during the reconnection process. The study is conducted for a physical mass ratio, in order to support current multi-spacecraft missions (specifically the NASA Magnetospheric Multi-Scale mission).

[1] S. Markidis, G. Lapenta, Rizwan-uddin, Mathematics and Computers in Simulation, Volume 80, 1509, 2010, DOI: 10.1016/j.matcom.2009.08.038.