



Role of Instabilities in Kinetic Magnetic Reconnection

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We report new simulations obtained with the 3D fully kinetic (electrons and ions are particles) and fully electromagnetic (the full set of Maxwell's equations is solved) massively parallel code iPIC3D [1]. We consider the instabilities present before and leading to the onset of reconnection in 3D-3V full kinetic models. And subsequently, as reconnection progresses fully, we investigate the instabilities that accompany and affect the progress of reconnection. The study is conducted for realistic plasma parameters for the Earth magnetic tail. The results of the simulations are analysed for the type and evolution of specific instabilities and wave modes, using a suite of tools including the use of virtual probes in the simulation resembling the traces obtained from satellite data in real space. Spectral studies and phase space distributions are used to investigate the nature and consequences of the instabilities. [1] S. Markidis, G. Lapenta, Rizwan-uddin, *Mathematics and Computers in Simulation*, Volume 80, 1509, 2010, DOI: 10.1016/j.matcom.2009.08.038.