
Eulerian Vlasov-Darwin simulations of magnetic reconnection

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Abstract

Magnetic reconnection is a fundamental and multi-scale plasma phenomenon where a topological reorganization of the magnetic field quickly dissipates magnetic energy into flow and thermal plasma energy. The cutting-edge measurements conducted by the NASA Magnetospheric Multi-Scale (MMS) mission allowed, for the first time and with a great detail, to investigate magnetic reconnection at electron scales. The synergy between numerical simulations and in-situ observations is decisive to fully comprehend magnetic reconnection and its implication for space and astrophysical plasmas.

Here, I will present preliminary numerical results obtained by employing the Eulerian Vlasov-Maxwell code ViDA, focusing on symmetric and asymmetric magnetic reconnection at electron scales. I will particularly describe the configuration of the electron diffusion region and investigate the generalized Ohm's law to decipher the fundamental non-ideal terms driving reconnection.

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