



Particle-in-Cell Simulations of Collisionless Magnetic Reconnection with a Non-Uniform Guide Field

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Results are presented of a first study of collisionless magnetic reconnection starting from a recently found exact nonlinear force-free Vlasov-Maxwell equilibrium. The initial state has a Harris sheet magnetic field profile in one direction and a non-uniform guide field in a second direction, resulting in a spatially constant magnetic field strength as well as a constant initial plasma density and plasma pressure. It is found that the reconnection process initially resembles guide field reconnection, but that a gradual transition to anti-parallel reconnection happens as the system evolves. The time evolution of a number of plasma parameters is investigated, and the results are compared with simulations starting from a Harris sheet equilibrium and a Harris sheet plus constant guide field equilibrium.