Simulations of current sheet thinning and reconnection

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Recent developments in the theory and simulation of nonlinear collisionless reconnection hold the promise for providing solutions to some outstanding problems in laboratory and astrophysical plasma physics. A key issue is the identification of fast reconnection rates that are insensitive to the mechanism that breaks field lines However, the plasmas mentioned above are weakly collisional, and hence obey a generalized Ohm$\acute{}$s law in which the Hall current and electron pressure gradient terms play a crucial role. This report presents Hall-MHD simulations of current sheet thinning and reconnection that include electron pressure tensor effects and study the dependence of a guide field on magnetic reconnection. The simulations results have been compared with full particle simulations and observations.