The Scaling of Forced, Collisionless Reconnection in a Simple 3D System

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We present two-fluid simulations of forced magnetic reconnection with finite electron inertia in a collisionless three-dimensional cube with periodic boundaries in all three directions. Comparisons are made to analogous two-dimensional simulations. Reconnection in this system is driven by a spatially localized forcing function that is added to the ion momentum equation inside the computational domain. Consistent with previous results in similar, but larger forced 2D simulations [1], for sufficiently strong forcing the reconnection process is found to become Alfvénic in both 2D and 3D, i.e., the inflow velocity scales roughly like some fraction of the Alfvén speed based on the upstream reconnecting magnetic field, and the system takes on a stable configuration with a dissipation region aspect ratio on the order of 0.15 [2].

[1] B. Sullivan, B. N. Rogers, and M. A. Shay, *Phys. Plas.* **12** (2005) 122312.
[2] B. Sullivan, B. N. Rogers, *Phys Plas.* **15** (2008) *in press.*