Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Energy Transfer through plasmoid reconnection in slab-geometry resistive MHD computations[1] JACOB MADDOX, CARL SOVINEC, University of Wisconsin - Madison — Magnetic reconnection can convert magnetic energy into thermal energy on timescales that are short relative to global resistive diffusion. While fast reconnection occurs on microscopic scales, it has significant implications for evolution on macroscopic scales. We present 2D resistive MHD computations that, for some conditions, evolve from global resistive evolution through linear tearing and island formation, to current-sheet formation, rapid plasmoid reconnection and back to resistive evolution, depending on the tearing stability and dissipation parameters. Conditions that develop fast, plasmoid-mediated reconnection transfer heat the plasma much faster than global resistive decay. The phase with fast plasmoid reconnection is characterized by high frequency creation and destruction of a variable number of plasmoid structures. We gather statistical information about the distribution of plasmoids formed and destroyed during the fast reconnection and link this distribution with the transfer of energy. The computations include viscous and resistive heating, without external sources or sinks, and the boundary conditions prevent a flux of energy into or out of the system; therefore, total system energy should be conserved. Hyper-resistive effects can arise due to micro-scale plasma fluctuations. Here, hyper-resistivity in our computations prevents current sheets from collapsing to the numerical resolution scale during plasmoid growth.

[1]This work is supported by the U.S. Dept. of Energy.

Jacob Maddox
University of Wisconsin - Madison

Date submitted: 03 Jul 2019 Electronic form version 1.4