Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Three-Dimensional Turbulent Reconnection Induced by the Plasmoid Instability YI-MIN HUANG, Princeton University, AMITAVA BHATTACHARJEE, Department of Astrophysical Sciences, Princeton University — It has been established that the Sweet-Parker current layer in high Lundquist number (S) reconnection is unstable to the super-Alfvenic plasmoid instability. Past two-dimensional (2D) magnetohydrodynamic simulations have demonstrated that the plasmoid instability leads to a new regime where the Sweet-Parker current layer changes into a chain of plasmoids connected by secondary current sheets, and the averaged reconnection rate becomes nearly independent of S. In a three-dimensional (3D) configuration with a guide field, the additional degree of freedom allows plasmoid instabilities to grow at oblique angles [Baalrud et al. Phys. Plasmas **19**, 022101 (2012)] and develop complex dynamics of flux ropes, which may be viewed as a self-generated turbulent state. In our 3D simulations, kinematic and magnetic energy fluctuations are observed to form cigar-shaped eddies elongated along the direction of local magnetic field, which is a signature of anisotropic MHD turbulence. Additionally, the energy fluctuation spectra are found to satisfy power laws in the inertial range. The characteristics of this self-generated turbulent reconnection are compared with corresponding 2D simulations of the same configuration, as well as turbulent reconnection driven by an external forcing.

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Date submitted: 11 Jul 2014 Electronic form version 1.4