

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Dissipation and Spectral Energy Transfer in the Relaxation of 3-D Force-Free Magnetic Sheet Pinch HUI LI, LANL, KEVIN BOWERS, Guest Scientist, LANL — Three-dimensional fully kinetic Particle-in-Cell plasma simulations are used to study the magnetic reconnection in an initially force-free plasma with a sheet pinch configuration. The configuration drives unstable collisionless tearing modes at multiple resonant surfaces. The nonlinear interactions among these modes eventually destroy the original flux surfaces and produce stochastic fields. This multi-layer reconnection process is accompanied by the production of sheets and filaments of intensified currents. In addition, the magnetic energy is transferred from the original shear length scale both to the large scales due to the global relaxation and to the smaller, kinetic scales for dissipation. The dissipation is dominated by thermal/pressure effects. The unique advantage of large-scale 3D PIC simulations (especially with increasing computing power) is that it offers the opportunity to capture both the fluid and kinetic effects simultaneously. We regard our present results as a step towards that goal.

Hui Li
Los Alamos National Laboratory

Date submitted: 21 Jul 2006

Electronic form version 1.4