Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Magnetic reconnection in space[1] ALLEN BOOZER, Columbia University — Models of magnetic reconnection in space plasmas generally consider only a segment of the magnetic field lines. The consideration of only a segment of the lines is shown to lead to paradoxical results in which reconnection can be impossible even in a magnetic field constrained to be curl free or can be at an Alfvén rate even when the plasma is a perfect conductor though pressureless. A model of reconnecting magnetic fields is developed that shows the smallness of the interdiffusion distance d_d of magnetic field lines does not limit the speed of reconnection but does provide a reconnection trigger. When the reconnection region has a natural length L_r, the spatial scale of the gradient of magnetic field across the magnetic field lines must reach $L_g \sim L_r \ / \ \ln(L_r \ /\mathrm{d}_d)^3$ for fast reconnection to be triggered, which implies a current density $j \sim B/\mu_0 L_g$. The relation between magnetic reconnection in space and in toroidal laboratory plasmas is also discussed.

[1]Supported by the U.S. Department of Energy grant ER5433.

Allen Boozer
Columbia University

Date submitted: 16 Jul 2012 Electronic form version 1.4