

Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

The Onset of Fast Magnetic Reconnection is Localized JOHN MEYER, PAUL CASSAK, MICHAEL SHAY, University of Delaware, JAMES DRAKE, University of Maryland, BRUNO ECKHARDT, Phillips-Universität Marburg — A subject of ongoing debate in the literature concerns the dependence of (fast) Hall reconnection on the system size, which is related to the issue of reconnection onset. Does the trigger occur near the boundary and propagate inward or is reconnection initiated near the X-line and propagate outward? Numerical simulations supporting either scenario exist. We present new evidence that the trigger is localized near the X-line, suggesting that local physics rather than global dynamics controls Hall reconnection. This is done by demonstrating the existence of an unstable steady-state magnetic reconnection solution which lies at the boundary of the basins of attraction of the Sweet-Parker and Hall reconnection solutions. Its identification required a novel iterative numerical technique. Eigenmodes of the unstable solution are localized near the X-line, suggesting that the onset of fast reconnection in a weakly collisional plasma initiates at the X-line. We will discuss these results in the context of other theories of fast magnetic reconnection.

Paul Cassak
University of Delaware

Date submitted: 24 Jul 2007

Electronic form version 1.4