Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Coalescence of Magnetic Islands in the low resistivity Hall MHD Regime. D.A. KNOLL, L. CHACON, A.N. SIMAKOV, LANL — We revisit the well-known problem of the coalescence of magnetic islands in the context of Hall MHD. Unlike previous work, we focus on regimes of small resistivity ($S \sim 10^6$) and where the ion skin depth $d_i \ll L$ (system size). These conditions are of relevance, for instance, in the solar corona and the earth's magnetotail. We aim to address under which conditions such systems can exhibit fast reconnection. First, we revisit the resistive MHD problem to further understand the well-known sloshing result.[1] Next, the interaction between the ion inertial length, d_i, and the dynamically evolving current sheet scale length, δ_J, is established.[2] Initially, $d_i \ll \delta_J$. If η is such that δ_J dynamically thins down to d_i prior to the well-known sloshing phenomena, then sloshing is avoided. This results in peak reconnection rates which are η-independent and scale as $\sqrt{d_i}$. However, if d_i is small enough that resistivity prevents δ_J from thinning down to this scale prior to sloshing, then reconnection (and sloshing) proceeds as in the resistive MHD model. Finally, we discuss our development of a semi-analytical model to describe the well-known sloshing result in the resistive MHD model,[3] and our plans to extend it to Hall MHD.

[1]D. A. Knoll, L. Chacón, *Phys. Plasmas*, **13** (3), p.032307 (2006).
[2]D. A. Knoll, L. Chacón, *Phys. Rev. Lett.*, **96**, 135001 (2006).
[3]A. Simakov, L. Chacón, D. A. Knoll, *Phys. Plasmas*, accepted (2006)

Luis Chacon
Los Alamos National Laboratory

Date submitted: 17 Jul 2006 Electronic form version 1.4