

# Coalescence of Magnetic Islands in the Low Resistivity, Hall MHD, Regime

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The coalescence of magnetic islands in the low resistivity,  $\eta$ , Hall MHD regime is studied. First we revisit this problem with the resistive MHD model to further understand the well known sloshing result. Next, the interaction between the ion inertial length,  $d_i$ , and the dynamically evolving current sheet scale length,  $\delta_J$ , is established. Initially,  $d_i \ll \delta_J$ . If  $\eta$  is such that  $\delta_J$  dynamically thins down to  $d_i$  prior to the well-known sloshing phenomena, then sloshing is avoided. This results in  $\eta$  independent peak reconnection rates. However, if  $d_i$  is small enough that  $\delta_J$  can not be thinned down to this scale prior to sloshing, then 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.