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Coalescence of Magnetic Islands in the High Lunquist Number, Hall MHD, Regime DANA KNOLL, LUIS CHACON, LANL — The coalescence of magnetic islands in the high Lunquist number, Hall MHD, regime is studied. Within the resistive MHD model the coalescence rate (reconnection rate) is known to be independent of Lunquist number over a range of Lunquist numbers. Biskamp [1] has shown that the coalescence rate will stall (sloshing) in the limit of high Lunquist number (S on the order of 10^5). This stalling has been associated with the onset of a secondary tearing mode [1]. We will demonstrate this stalling results from high magnetic pressure gradients, which result from thin current sheets. The high magnetic pressure shuts down the ion flow into the current sheet, which effectively limits the transport of fresh flux into the reconnection site. We then simulate the problem with a Hall MHD model. We demonstrate that when the current sheet scale length, δ_J, reaches "Hall MHD scales" (i.e. $\delta_J < d_i$, where d_i is the ion inertial length) prior to the onset of sloshing, sloshing will be avoided and island coalescence will proceed at a rate independent of Lunquist number. Note that d_i may be small for the intial conditions of the problem.

[1] D. Biskamp, Phys. Lett. A, vol. 87, pp. 357-360 (1982)

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