HALL DRIVEN INSTABILITY IN ABLATING PLASMA*

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We consider the Hall effect in pulsed power generated plasma flows and its role in the creation of radial electric fields and plasma instability. We have developed a code based on the generalized Ohm's law plasma description that has allowed us to explore physics neglected by the resistive magnetohydrodynamic (MHD) model. We present simulation results of imploding Aluminum cylindrical wire arrays and plasma liners on the 1 MA COBRA machine, where both finite electron inertia and the Hall term are retained. The Hall effect introduces asymmetry into the system through plasma flows parallel to the liner surface, directed from the anode to the cathode. Simulations also show that inclusion of the Hall term delays the arrival of cathode precursor plasma to the geometric axis. Additionally, inclusion of the Hall term produces instability in ablating regions where the ion inertial length is of order one millimeter. This instability saturates at a constant wavelength, near the fundamental for Aluminum, and imprints itself into the precursor column.

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*This research was sponsored in part by the National Nuclear Security Administration under the Stewardship Science Academic Alliances program through DOE Cooperative Agreement #DE-FC52-06NA00057.