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Calculational Study of the Z-Pinch Dynamics of Resistively Thick Aluminum Rods SETH KREHER, University of Nevada, Reno, CHRIS ROUSCULP, Los Alamos National Laboratory, BRUNO BAUER, University of Nevada, Reno — The fundamental limits of high-current conduction are of interest to magnetically driven ICF and other applications. Nonlinear Ohmic heating and conductor motion lead to instabilities such as the Electrothermal Instability (ETI) and Magneto-Rayleigh Taylor (MRT) that disrupt current flow. Here, the LANL, resistive MHD code, FLAG, is used to model, well-diagnosed, uncoated Al rod loads (R_0 ˜400 μm >skin-depth) in a Z-pinch configuration fielded on the Sandia Mykonos pulse generator (t_{rise} ˜0.1 μs, I_{peak} ˜1 MA). Results are compared to PDV measurements. Initial rod compression due to Lorentz forces in the solid-state agree well with experiments. After melt, during expansion, results with a tabular EOS that utilizes Maxwell constructs in the bi-phase region show better agreement to data than ones with Van der Waals loops. As predicted, the state of the outer layer of the rod follows the liquid/vapor coexistence curve. Finally, calculational sensitivity to EOS and conductivity are studied to better understand the expansion dynamics.

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