

Abstract Submitted
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Observation and Simulation of Electro-thermal Instabilities in Condensed States of Aluminum and Copper¹ KYLE PETERSON, DANIEL SINARS, MARK HERRMANN, EDMUND YU, Sandia National Labs — Electro-thermal instabilities, also referred to as overheat instabilities, are the result of non-uniform heating due to temperature dependence in the conductivity of a material. In the condensed state of metals, the conductivity decreases with increasing temperature, which can result in axial layered instabilities perpendicular to current flow. These instabilities were studied on the Sandia National Laboratories Z facility by driving solid, 6mm and 12mm diameter, aluminum and copper rods with a ~ 100 ns risetime current pulse to surface current densities of $\sim 10^8 A/cm^2$. Simulations of these experiments were performed with LASNEX, a 2D magnetohydrodynamic code. We present the data and analysis of these experiments including a comparison of the electro-thermal instability growth rate and striation wavelength measured using two frame x-ray backlighting to simulated radiographs.

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