Abstract Submitted
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Development of the electrothermal instability from resistive inclusions[1] EDMUND YU, T.J. AWE, Sandia National Laboratories, B.S. BAUER, K.C. YATES, University of Nevada, Reno, W.G. YELTON, Sandia National Laboratories, T.M. HUTCHINSON, S FUELLING, University of Nevada, Reno, B.B. MCKENZIE, K.J. PETERSON, Sandia National Laboratories — The magneto Rayleigh-Taylor (MRT) instability limits the performance of all magnetically imploded systems. In the case of compressing metal liners, as in the magnetized liner inertial fusion concept, a dominant seed for MRT is believed to be the electrothermal instability (ETI). Here, linear theory predicts the most unstable mode manifests as horizontal (i.e. perpendicular to current flow) bands of heated and expanded metal. However, how do such bands, known as striations, actually develop from a smooth metal surface? Recent experiments on ETI evolution, performed at the University of Nevada, Reno, provide a possible answer: pre-shot characterization of aluminum rods show numerous resistive inclusions, several microns in diameter and distributed throughout the rod. In this work, we use 3D MHD simulation and analytic theory to explore how current redistribution around these isolated inclusions, combined with ETI, can lead to rapid formation of the global striation structures. Later in time, striations expand and form density perturbations much larger than the initial inclusion size.

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