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Magnetohydrodynamic Calculations of Resistively Exploding Aluminum Rods[1] SETH KREHER, University of Nevada, Reno, CHRIS ROUSCULP, Los Alamos National Laboratory, BRUNO BAUER, TREVOR HUTCHINSON, University of Nevada, Reno, IRV LINDEMUTH, Los Alamos National Laboratory — The magnetic field diffusion into a conductor driven by intense pulsed power is of interest for current-driven instabilities such as the electrothermal instability (ETI). ETI is thought to develop on the surface of a conductor due to uneven ohmic heating and variation in resistivity that follows the spatial distribution of the current density as impacted by surface roughness and inclusions. The magnetic field also diffuses radially inward to the center of a cylindrical rod in a nonlinear magnetic diffusion wave (NDW)diffusing more rapidly into the conductor interior because of resistivity increases driven by rising temperatures. The NDW interplays with the inward shock wave caused by the magnetic force and ejection of low-density material from the conductor surface. The ASC Magnetohydrodynamic (MHD) code FLAG developed by Los Alamos National Lab was used to numerically calculate the radial magnetic field diffusion within an exploding rod, in the skinned current regime, including hydrodynamic effects.

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