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2D Resistive Magnetohydrodynamics Calculations with an Arbitrary Lagrange Eulerian Code C. L. ROUSCULP, T. A. GIANAKON, K. N. LIPNIKOV, E. M. NELSON, Los Alamos National Laboratory — Single fluid resistive MHD is useful for modeling Z-pinch configurations in cylindrical geometry. One such example is thin walled liners for shock physics or HEDP experiments driven by capacitor banks such as the LANL's PHELIX or Sandia-Z. MHD is also useful for modeling high-explosive-driven flux compression generators (FCGs) and their high-current switches. The resistive MHD in our arbitrary Lagrange Eulerian (ALE) code operates in one and two dimensions in both Cartesian and cylindrical geometry. It is implemented as a time-step split operator, which consists of, ideal MHD connected to the explicit hydro momentum and energy equations and a second order mimetic discretization solver for implicit solution of the magnetic diffusion equation. In a staggered grid scheme, a single-component of cell-centered magnetic flux is conserved in the Lagrangian frame exactly, while magnetic forces are accumulated at the nodes. Total energy is conserved to round off. Total flux is conserved under the ALE relaxation and remap. The diffusion solver consistently computes Ohmic heating. Both Neumann and Dirichlet boundary conditions are available with coupling to external circuit models. Example calculations will be shown.

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