Abstract Submitted
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The Magnetized Noh Problem as a Verification Test for Z-Pinch Simulation Codes[1] J.L. GIULIANI, A.L. VELIKOVICH, J.W. THORNHILL, Plasma Physics Division, Naval Research Laboratory, S.T. ZALESAK, Berkeley Research Assoc. — Advanced simulations of high energy density Z-pinch plasmas involve 2D and 3D computer codes. The classic Noh problem of a strong, self-similar expanding shock accreting inflowing gas of constant velocity is often used for verification of hydrodynamic codes. The more relevant test of the M in MHD appropriate for a stagnating pinch are the new, exact, self-similar solutions that extend the Noh problem to include ideal MHD with an azimuthal magnetic and non-uniform velocity profiles for the inflowing gas. This magnetized Noh problem is used to test two R-Z MHD codes, MACH2 and CERBERUS, and the 3D MHD Cartesian code ATHENA. Comparison of the simulations against the self-similar solution shows good agreement for CERBERUS, while the Cartesian code appears subject to a growing instability which can be removed with a diffusive Riemann solver. In summary, the magnetized Noh problem is a new and challenging verification tool for MHD codes designed to model imploding Z pinches.

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