Abstract Submitted
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On the Modeling of PHELIX and Other Pulsed-Power Experiments CHRISTOPHER ROUSCULP, WILLIAM REASS, DAVID ORO, PETER TURCHI, DAVID HOLTKAMP, JEFFERY GRIEGO, ROBERT REINOVSKY, Los Alamos National Laboratory — At LANL, pulsed power hydrodynamics employs multi mega-Amp currents, over tens of microseconds, producing hundreds of kilogauss fields in a Z-pinch configuration for the study of shocks, fluids, and material physics. The new PHELIX portable pulsed power machine demonstrated for first time the efficient coupling of a high-power capacitor bank via a toroidal transformer to a central load. The whole system sits on a 200 square foot platform for use at the LANL proton radiography facility. Additionally, magnetic FCGs are employed for very high energy density experiments. Here, explosives propel metal conductors in a coaxial, helical, or disk system to produce tens of mega-Amp currents. Currents carried in the skin depth are subject to intense Lorentz forces and Joule heating. Single-fluid, resistive MHD theory with material properties of the conductors well characterizes the experiments. One and two-dimensional computational codes solve the equations of mass, momentum, field, and energy. The grids are coupled to circuit equations describing the pulsed power driver. Results of recent experiments will be compared to modeling.

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