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Hybrid Simulations and Scaling Laws for Shock Formation in the UCLA Collisionless Shock Experiment[1] DAVID LARSON, LLNL, DAN WINSKE, MISA COWEE, LANL, S. ERIC CLARK, CHRISTOPH NIEMANN, UCLA, STEPHEN BRECHT, Bay Area Research Corporation — Two- and three-dimensional simulations are used to compare and contrast the plasma expansion, formation of a magnetic cavity, and generation of an outgoing shock wave for conditions relevant to the laser experiment at UCLA, as a function of the background ion mass. A model of the shock formation process is constructed that yields an expression for the speed of the shock, which we show is in good agreement with the simulations. In addition, the criteria for generating strongly-coupled shocks are derived and simulations are used to examine the velocity scaling obtained via momentum conservation.

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