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Ram-pressure scaling and non-uniformity characterization of a spherically imploding liner formed by hypervelocity plasma jets JASON CASSIBRY, JESSE DOUGHERTY, SETH THOMPSON, Propulsion Research Center, SCOTT HSU, Los Alamos National Laboratory, F.D. WITHERSPOON, HyperV Technologies Corp., UNIVERSITY OF AL IN HUNTSVILLE TEAM, LOS ALAMOS NATIONAL LABORATORY TEAM, HYPERV TECHNOLOGIES CORP. TEAM — Three-dimensional modeling of plasma liner formation and implosion is performed using the Smoothed Particle Hydrodynamics Code (SPHC) with radiation, thermal transport, and tabular equations of state (EOS), accounting for ionization, in support of a proposed 60-gun plasma liner formation experiment for plasma-jet driven magneto-inertial fusion (PJMIF). Previous SPHC modeling showed that ideal gas law scaling of peak stagnation pressure increased linearly with density and number of jets, quadratically with jet radius and velocity, and inversely with the initial jet length, while results with tabular EOS, thermal transport, and radiation have greater sensitivity to the initial jet distribution. A series of simulations are conducted to study the effects of initial jet conditions on peak ram pressure and liner non-uniformity during plasma liner implosion. The growth rate of large-amplitude density perturbations introduced by the discrete jets are computed and compared with predictions by the Bell-Plesset equation.

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