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Semi-analytical model of plasma-jet-driven magneto-inertial fusion[1] SAMUEL LANGENDORF, SCOTT HSU, Los Alamos National Laboratory — Plasma-jet-driven magneto-inertial fusion (PJMIF) is an MIF concept in which a spherically imploding plasma liner is formed from the convergence of a large number of discrete supersonic plasma jets, and the assembled liner is employed to compress a magnetized fuel target [Hsu et al., IEEE Trans. Plasma Sci. **40**, 1287 (2012)]. We formulate a 1D spherical-geometry MIF model and apply it to PJMIF. The model incorporates compressible hydrodynamics, liner ionization, radiation, D-T fusion burn, heat conduction losses, magnetic pressure, magnetic flux losses via the Nernst effect, and charged-particle energy deposition. We study the effects of different transport outcomes (e.g., optically thin vs. optically thick radiation transport, classical vs. Bohm-like thermal diffusivity), and scan the liner-target parameter space for configurations with optimal fusion gain at a given total energy. We find that gain-optimal implosion velocity depends significantly on the liner temperature. For liners at approximately room temperature, an implosion speed of roughly 70 km/s is advantageous over faster speeds due to increased dwell time at stagnation.

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