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Ion-viscosity effects on plasma-liner formation and implosion via merging supersonic plasma jets KEVIN SCHILLO, JASON CASSIBRY, Univ of Alabama - Huntsville, ROMAN SAMULYAK, WEN SHIH, Stony Brook University, SCOTT HSU, LANL, PLX-ALPHA TEAM — The PLX-α project endeavors to study plasma-liner formation and implosion by merging a spherical array of plasma jets as a candidate standoff driver for MIF. Smoothed particle hydrodynamics is used to model the liner formation and implosion processes. SPH is a meshless Lagrangian method to simulate fluid flows by dividing a fluid into a set of particles and using a summation interpolant function to calculate the properties and gradients for each of these particles. Ion viscosity is anticipated to be an important mechanism for momentum transport during liner formation, implosion, and stagnation. To study this, ion viscosity was incorporated into the code. To provide confidence in the numerical output and to help identify the difference between numerical and physical diffusion, a series of test cases were performed, consisting of Couette flow, Gresho vortex, and a Taylor-Green vortex. An L2-norm analysis was performed to measure the error and convergence. Simulations of conical (6 jets) and 4π (60 jets) liners with and without ion viscosity reveal potential effects of viscosity on ram pressure, Mach-number degradation, and evolution of liner perturbations during jet merging and liner implosion.

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