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Simulation studies of plasma target compression by argon liners LINA ZHANG, HYOUNGKEUN KIM, Stony Brook University, ROMAN SAMULYAK, Stony Brook University and Brookhaven National Laboratory, ROMAN SAMULYAK TEAM — Simulation studies of plasma liners, formed by the merger of argon plasma jets, and the compression of plasma targets in the concept of the plasma jet driven magnetoinertial fusion have been performed using FronTier code. FromTier is a hybrid Lagrangian-Eulerian code that uses explicit tracking of material interfaces, thus enabling accurate resolution of hydro instabilities, and average ionization EOS models for high-Z materials. The jets merger process is accomplished through a cascade of oblique shock waves leading to the non-uniformity of imploding plasma liner and causing the Reyleigh-Taylor instability of target during compression. The stagnation pressure, deconfinement time, Rayleigh-Taylor instabilities of the target surface, and the production of fusion neutrons were analyzed for 2D simulations that included 8, 16, and 32 jets, 3D simulation with 90 jets, and compared with the corresponding cylindrically (2D) and spherically (3D) symmetric simulations. The liner non-uniformity induces instabilities in the plasma targets that result in the reduction of stagnation pressure and fusion energy. For example, 8 time reduction of the stagnation pressure and 31 time reduction of the fusion energy was observed when the 2D simulation involving 16 jets was compared to 1D simulation.

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