Abstract Submitted
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MHD wind tunnel[1] M.R. BROWN, Swarthmore College, T. GRAY, X. ZHANG, D. DANDURAND — Preliminary results are presented from a high-velocity, turbulent MHD wind tunnel at the SSX facility. The prototype wind tunnel has dimensions $L = 1\ m$ and $R = 0.08\ m$. Flow is measured with a cylindrical Mach probe calibrated both with magnetic time-of-flight and ion Doppler spectroscopy. Magnetic structure and turbulence are measured with arrays of magnetic probes. In a typical experiment, a magnetized plasma plume is injected at one end at $v \geq 50\ km/s$ then the plasma turbulently evolves down the wind tunnel and relaxes to a final state. We measure a relaxed final state with helical twist corresponding to the injected helicity and with $\lambda R = 3.15$, where the fields are minimum energy solutions to the Taylor state: $\nabla \times \mathbf{B} = \lambda \mathbf{B}$. The cylindrical copper boundary is baked and cleaned in a He glow discharge to maintain excellent vacuum conditions. Typical plasma parameters are $T_i = 25\ eV, T_e = 10\ eV, n_e \leq 10^{21}\ m^{-3}, B = 0.25\ T$. Merging experiments with plasma plumes injected from both ends are planned. Results of the merging studies will be presented if available.

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