Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Experimental and modeling investigation of longitudinal plasma acceleration on the FuZE experiment.[1] A.D. STEPANOV, U. SHUMLAK, University of Washington, B.A. NELSON, Zap Energy, Inc, E.L. CLAVEAU, T.R. WEBER, University of Washington, Y. ZHANG, Zap Energy, Inc — The Fusion Z-Pinch Experiment FuZE investigates sheared-flow stabilization of classic m = 0/1 instabilities in Z-pinches with an embedded axial flow. FuZE consists of a 100 cm coaxial plasma accelerator, where neutral gas is ionized and accelerated in a pulsed electrical discharge, followed by a 50 cm assembly region, where pinches are formed. Maintaining the pinch requires continuous plasma injection provided by a deflagration mode in the coaxial accelerator. Two discharge modes, with and without deflagration, are investigated on FuZE. Pinch formation is observed with deflagration only. Plasma velocities in the assembly region are found to match the ExB velocity estimated in the accelerator based on a 1D circuit model, indicating that a 1D MHD approximation may offer a valid description of the plasma in the accelerator channel. The velocity of magnetic field propagation is found to agree with the snowplow model based on momentum conservation, and the lifetime of the pinch is shown to be in agreement with constraints imposed by mass conservation.

[1]Work supported in part by ARPA-e ALPHA and OPEN 2018 awards.

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Date submitted: 29 Jun 2020 Electronic form version 1.4