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**Overview of the FuZE Fusion Z-Pinch Experiment**[1] U. SHUMLAK, B.A. NELSON, E.L. CLAVEAU, E.G. FORBES, B.R. HENDERSON, A.D. STEPANOV, Y. TAKAGAKI, T.R. WEBER, Z. ZHANG, University of Washington, H.S. MCLEAN, D.P. HIGGINSON, J.M. MITRANI, K.K. TUMMEL, Lawrence Livermore National Laboratory — Closely coupled with computational studies, the FuZE project is investigating the sheared flow stabilized (SFS) Z-pinch as a novel approach to thermonuclear fusion in a compact device. The SFS Z-pinch is immune to the instabilities that plague the conventional Z-pinch yet maintains the same favorable radial scaling. Diagnostic measurements of the plasma equilibrium and stability indicate that in the presence of a sufficiently large flow-shear, gross Z-pinch instabilities are mitigated, and radial force balance is achieved. Fluid and kinetic simulations support the experimental observations. The FuZE device generates stable, 50-cm-long plasma columns that are compressed to small radii (3 mm), producing increases in magnetic field (10 T), density (1e17 /cc), and electron temperature (1 keV) as predicted by adiabatic scaling relations. When operated with deuterium, the plasma reaches fusion conditions as indicated by a sustained neutron production that is consistent with a thermonuclear process. Experimental observations generally agree with theoretical and computational predictions, indicating that sheared flows can indeed stabilize and sustain a Z-pinch equilibrium.

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