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Z-pinch stability in the presence of an axial flow¹ R. PRESURA, D. MARTINEZ, S. STEIN, C. PLECHATY, S. NEFF, Nevada Terawatt Facility, University of Nevada, Reno, NV 89506 — In axially symmetric wire array z-pinches, axial flow can be produced by tilting the wires radially. Adding a wire on the axis of the resulting conical wire array introduces a radial profile in the axial velocity of the flow. For certain conditions, such a shear flow has been predicted theoretically to have a mitigating effect on z-pinch instabilities, but experimental support for this stabilization mechanism is scarce. At the Nevada Terawatt Facility, experiments with conical wire arrays driven by the 1 MA Zebra z-pinch showed improved stability both in the precursor and the stagnation phases of the z-pinch. To focus on the kink ($m=1$) instability, the study included central wires with helical perturbations. Strong experimental evidence supports the formation of shear flow in the presence of a central wire. The stabilizing effect of the shear flow was assessed by comparing the evolution of the pre-imposed perturbation in equivalent conical and cylindrical arrays.

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