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Gyrokinetic simulations of a Z pinch PAOLO RICCI, BARRETT ROGERS, Dartmouth College, WILLIAM DORLAND, University of Maryland — We present nonlinear gyrokinetic simulations of small-scale turbulence in a Z-pinch magnetic geometry using the GS2 code. We explore the dynamics of the turbulent transport as a function of various parameters in the system, including the collisionality and the strength of the plasma gradients. In good agreement with analytic calculations, at sufficiently steep gradients we observe the ideal interchange instability. At weaker gradients somewhat below the ideal threshold, turbulence is driven by the so-called entropy mode, which has peak growth rates at $k_{\perp}\rho_i \sim 1$. The particle transport driven by this mode is very strongly dependent on the strength of the gradients and the collisionality. The break-up of the linear modes by the Kelvin-Helmholtz instability generates strong ExB (zonal) flows along the symmetry axis that, in the absence of collisions, can greatly reduce or even essentially eliminate the transport. In the presence of sufficiently strong collisions, however, these zonal flows can be strongly damped, and a large enhancement of the transport is observed.

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