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Strong, nonaxisymmetric flows driven in a dipole-confined plasma[1] M.W. WORSTELL, B.A. GRIERSON, S. STATTEL, M.E. MAUEL, Columbia University — Previous studies using the Collisionless Terella Experiment (CTX) have shown plasma dynamics to be dominated by interchange mixing. Since the geometry of the dipole magnetic field has no shear, interchange turbulence and interchange transport becomes two-dimensional. The usually complicated study of plasma turbulence and transport becomes less so in dipole geometry, provided plasma dynamics is appropriately described with field-line averaged quantities. In this presentation, strong, nonaxisymmetric plasma flows are induced by application of electrostatic bias in two ways. The first approach employs a negatively biased (~ -1000 V) large diameter probe inserted at various radii in order to charge a central flux-tube and drive nonaxisymmteric cross-field currents. The second approach employs a non-axisymmetric bias applied to a series of meshes located at the inner, equatorial edge of the plasma. Static biasing as well as triggered biasing have been investigated. Very strong plasma flows can be induced, and these allow systematic study of nonlinear effects such as electrostatic structure coupling. Additionally, we observe a dramatic decrease in low-frequency turbulent fluctuations when the strength of the nonaxisymmetric bias exceeds a threshold.

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