Abstract Submitted
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Finite beta effects in the Cyclone Base Case[1] YANG CHEN, SCOTT E. PARKER, University of Colorado at Boulder — It has loog been observed in Particle-in-Cell simulations of the Cyclone Base Case that simulations do not saturate at β values well below the Kinetic Balooning Mode threshold. The dominant instabilities are broken up by the self-generated zonal flows in the early nonlinear stage, but subsequently lower k_θ modes slowly emerge and grow to large amplitude, leading to large streamer transport. Here we investigate this problem based on a new flux-tube code. Starting with the global GEM, all the equilibrium quantities, such as $B(r,\theta)$ and $T(r)$, are set to their values at the center (the flux-tube location). A linear $q(r)$ profile is still used to compute the toroidal shift when matching the two boundaries along the field line. This implementation differs from the earlier one chiefly in that additional terms in the equation of motion along $\mathbf{B}$, small but needed to preserve P_ζ as a constant of motion, are retained. These apparently have a stabilizing effect on low k_θ modes, allowing us to push β closer to the KBM threshold. Collisions, radial boundary conditions and coarse-graining are all observed to strongly affect the nonlinear state at high β. Detailed results will be presented and compared with Eulerian simulations [Candy, Phys. Plasmas **12**, 072307 (2005)].

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