Abstract Submitted
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Gyrokinetic Studies of ETG Turbulence in NSTX, and Comparisons of Advection Algorithms[1] G.W. HAMMETT, J.L. PETERSON, D.R. MIKKELSEN, S.M. KAYE, Princeton Plasma Physics Laboratory, R.E. WALTZ, J. CANDY, General Atomics — Electron temperature gradient (ETG) driven turbulence has been predicted to be important in some parameter regimes[2]. High-k fluctuations have recently been measured[3] in the National Spherical Torus Experiment (NSTX), at $k_\theta \rho_e \sim 0.1 - 0.4$, in the range of ETG turbulence. We are undertaking studies of ETG turbulence for NSTX cases using the GYRO gyrokinetic code. Among other results, we will show the dependence of some of the linear ETG properties on magnetic shear, q, and $Z_{eff} T_e/T_i$. Microtearing may also be important in some cases. On another topic, we will compare various advection algorithms on simple 1-D and 2-D test problems. The edge region in a magnetic fusion device has very steep density variations, which can cause problems for standard advection algorithms. Gibb's phenomena can lead to negative overshoots in the density solution; however, modern high-order upwind methods, developed initially for shock capturing, can preserve positivity of density, making them useful for edge gyrokinetic simulations.

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[2]W. Dorland, F. Jenko, et al., Phys. Rev. Lett. **85**, 5579 (2000)
[3]E. Mazzucato, D. R. Smith, et al., Phys. Rev. Lett. **101**, 075001 (2008)

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