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Gyrokinetic Turbulence Simulation Challenges in the NSTX Spherical Torus J.L. PETERSON, G.W. HAMMETT, D. MIKKELSEN, S. KAYE, Princeton Plasma Physics Laboratory, J. CANDY, R.E. WALTZ , General Atomics — Recent progress in the numerical simulation of plasma turbulence has led to a greater understanding of the mechanisms behind anomalous heat and particle losses in tokamaks. However, the source of turbulent transport in machines with smaller aspect ratios, such as the National Spherical Torus Experiment (NSTX), remains elusive. Leading contenders for explaining transport in spherical tori include turbulence driven by the Electron Temperature Gradient (ETG) mode and microtearing modes. The coupling of ITG and ETG turbulence complicates simulations in regular tokamaks. However, the flow-driven suppression of long wavelength modes in NSTX may reduce the resolution requirements for ETG simulations. Reduced ion models, which still include the enhancement of zonal flows on the ion gyroradius scale, may also speed up ETG simulations. Here we present some linear studies of microtearing and ETG modes for NSTX parameters using the GYRO nonlinear gyrokinetic code[1] and some initial nonlinear studies of the resulting turbulence.

[1]J. Candy, R. E. Waltz et al., J. Phys. Conf. Ser. **78**, 012008 (2007).

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