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Gyrokinetic TEM Turbulence Simulation Compared to Experimental Heat Flux and Fluctuations in the HSX Stellarator (PhD Oral-24)[1] J. SMONIEWSKI, B. J. FABER, I. J. MCKINNEY, K. M. LIKIN, J. N. TALMADGE, University of Wisconsin - Madison, M. J. PUESCHEL, Institute for Fusion Studies, University of Texas at Austin — Strong anomalous transport outside the core of the the Helically Symmetric eXperiment (HSX) is likely due to the Trapped Electron Mode (TEM). This study compares linear and nonlinear gyrokinetic simulations from the GENE code to experimental heat flux and density fluctuation measurements for two configurations: Quasi-Helical Symmetry (QHS) and broken symmetry (Mirror). The Mirror configuration reduces the overlap of the magnetic trapping and bad curvature regions, and reduces the peak TEM linear growth rates. While this suggests the heat flux would be smaller in the Mirror configuration, neither the experimental or nonlinear simulation heat flux matches this expectation. At zero temperature gradient, the electron heat flux is reduced in the QHS configuration, but the difference is negated when including finite temperature gradient and non-unity electron/ion temperature ratio. Matched to experimental parameters, the magnitude of the heat flux from nonlinear simulation shows good agreement with experimental measurements. Simulated density fluctuations are larger when the density gradient exceeds the electron temperature gradient, and reflectometer measurements of turbulence amplitudes localized to the peak driving gradient will be compared to simulation results.

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