Electron Transport Analysis in NSTX

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We present the electron transport analysis of the NSTX data based on the nonlinear gyrofluid models of ITG/TEM and ETG. The simulation observes that there is strong electron heat flux peaked at $k_y\rho_e \sim 0.25$ and electrostatic perturbation at $k_y\rho_e \sim 0.3$. The full k-space of the heat flux and the density fluctuations are shown which enables the comparison of the high-k scattering data for modes with $k_y \sim 0$ and $k_x = 21.2$, 17.5, 14.6 10.6 cm^{-1} with the modes that dominate the thermal flux with $k_y \gg k_x$. The bifurcation into and out of the H-mode shows strong supression of the ITG/TEM scale modes but a weak effect on the ETG modes.

The (β_e, L_s/R)-dependence of electron heat flux obtained by the computations are compared with the ETG heat flux formulae given by Horton et al. [1]. The statististical analysis from the nonlinearly saturated ETG turbulence simulation will be presented with emphasis on the dynamics of the the relative phase angle between the electron temperature and potential (density) phase angles that control the convective thermal flux contributions. A simple realtime quick-look predictor of the strength of the ITG and ETG turbulence is proposed and applied to historical NSTX discharge shot 120967.

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[1] W. Horton, G. T. Hoang, C. Bourdelle, X. Garbet, M. Ottaviani, and L. Colas, Phys. Plasmas **11**, 2600 (2004).