Studies of NSTX L and H-mode Plasmas with Global Gyrokinetic Simulation

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Plasma turbulence is considered one of the main mechanisms for driving anomalous thermal transport in magnetic confinement fusion devices. Based on first principle model, gyrokinetic simulations play an important role in studying the relation between plasma turbulence and anomalous thermal transport. In order to predict the confinement performance of future devices, it is crucial to validate gyrokinetic codes against experiments. Nonlinear local gyrokinetic simulations have been used to asses turbulence-driven transport in NSTX L and H-mode plasmas [1,2], and agreement in thermal transport with experiments has only been observed in limited cases. Due to the larger ρ^* of NSTX compared to conventional tokamaks, global effects may be important in determining thermal transport. Here, we present nonlinear global gyrokinetic simulations of NSTX L and H-mode plasmas using global gyrokinetic code GTS [3] and comparisons with experimental transport analysis. Comparisons with nonlinear local gyrokinetic simulations will be also be presented. The work is supported by DOE and computational resource is provided by NERSC.

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