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Reduced models for electron and ion heat diffusivities by gyrokinetic simulation with kinetic electrons in helical plasmas S TODA, M NAKATA, M NUNAMI, National Institute for Fusion Science, A ISHIZAWA, Graduate School of Energy Science, Kyoto University, T -H WATANABE, Department of Physics, Nagoya University, H SUGAMA, National Institute for Fusion Science
— A reduced transport model of the turbulent ion heat diffusivity was proposed by the gyrokinetic simulation code (GKV-X) with the adiabatic electrons for the high-T_i Large Helical Device discharge for the dynamical transport simualtion. The nonlinear gyro-kinetic simulation is performed with the kinetic electron. The plasma parameter region of the short poloidal wave-number is studied, where the ion temperature gradient mode becomes unstable. The models of the turbulent heat diffusivities are derived as the function of the squared electrostatic potential fluctuation and the squared zonal flow potential. Next, the squared electrostatic potential fluctuation is approximated with the mixing length estimate. The squared zonal flow potential fluctuation is shown as the linear zonal flow response function. The linear zonal flow response as the simulation result with the kinetic electron is found to be different from that with the adiabatic electron. The reduced models of the turbulent electron and ion heat diffusivities are derived as the function of the physical parameters by the linear simulation with the kinetic electron.

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