Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Construction of reduced transport model by gyro-kinetic simulation with kinetic electrons in helical plasmas S. TODA, M. NAKATA, M. NUNAMI, National Institute for Fusion Science, National Institutes of Natural Sciences, A. ISHIZAWA, Graduate School of Energy Science, Kyoto University, T. -H. WATANABE, Department of Physics, Nagoya University, H. SUGAMA, National Institute for Fusion Science, National Institutes of Natural Sciences — A reduced model of the turbulent ion heat diffusivity is proposed by the gyrokinetic simulation code (GKV-X) with the adiabatic electrons for the high-T_i Large Helical Device discharge. The plasma parameter region of the short poloidal wavelength is studied, where the ion temperature gradient mode becomes unstable. The ion heat diffusivity by the nonlinear simulation with the kinetic electrons is found to be several times larger than the simulation results using the adiabatic electrons in the radial region $0.46 \leq r/a \leq 0.80$. The electromagnetic contribution is about a several percent in the ion energy flux. The model of the turbulent diffusivity is 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 reduced model of the turbulent diffusivity is derived as the function of the physical parameters by the linear GKV-X simulation with the kinetic electrons. This reduced model is applied to the transport code with the same procedure as [1]. [1] S. Toda et al., J. Phys.: Conf. Ser. Vol. 561 012020 (2014)

S. Toda
National Institute for Fusion Science, National Institutes of Natural Sciences

Date submitted: 12 Jul 2016 Electronic form version 1.4