Abstract Submitted
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How to apply a turbulent transport model based on a gyrokinetic simulation for helical plasmas S. TODA, M. NUNAMI, A. ISHIZAWA, National Institute for Fusion Science, T.-H. WATANABE, Department of Physics, Nagoya University, H. SUGAMA, National Institute for Fusion Science — A reduced transport model for the turbulent ion heat diffusivity due to the ion temperature gradient (ITG) mode was obtained from the gyrokinetic simulation using the GKV-X code for the high-T_i Large Helical Device discharge [1]. This model is given by the function of the linear growth rate of the ITG mode divided by the square of the poloidal wavenumber integrated over the poloidal wavenumber space, $\mathcal{L}$ and the zonal flow decay time. The zonal flow decay time is calculated only at the initial state in the transport simulation, when the field configuration is temporally fixed. However, it takes a huge cost to carry out linear gyrokinetic simulations of the growth rate at each time step in the transport code. How to apply the reduced model to the temporal transport simulation is proposed with a low computational cost. Modeling of $\mathcal{L}$ is necessary to be involved with a parameter dependence of the plasma instability in the transport code. The ion temperature gradient scale length is chosen to apply $\mathcal{L}$ to the transport code for the ITG mode. The calculation in this study reproduces the results of the reduced model with an extremely low computational cost.

[1] M. Nunami, T. -H. Watanabe and H. Sugama, Phys. Plasmas Vol. 20. 092307 (2013)

Shinichiro Toda
National Institute for Fusion Science

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