F-I12

1st Asia-Pacific Conference on Plasma Physics, 18-23, 09.2017, Chengdu, China

Turbulent Particle Transport in Transport Barriers

M. K. Han[1,2], J. Q. Dong[2,3], Z. X. Wang[1], J. Cheng[2], H. R. Du[1] and Y. Shen[2]

[1] Key Laboratory of Materials Modification by Laser, Ion and Electron Beams (Ministry of Education), School of Physics, Dalian University of Technology, Dalian 116024, China,

[2] Southwestern Institute of Physics, P. O. Box 432, Chengdu, Sichuan 610041, China

[3] Institute for Fusion Theory and Simulation, Zhejiang University, Hangzhou 310027, China

Experiments in tokamaks show that, in addition to neoclassical transport, small-scale turbulence induced by drift instabilities plays a significant role in particle transport. In recent H-mode experiments on HL-2A, it is found that the turbulent fluctuations induce inward particle flux and increases of density, pressure and their gradients. The particle transport in transport barriers is investigated with a gyrokinetic quasi-linear turbulent model for ion temperature gradient modes and trapped electron modes with impurity effects included. Detailed analyses of the particle flux dependence on plasma parameters, including the gradients of density and temperature, magnetic shear, safety factor, collision etc., were performed. The numerical simulation results are compared and shown reasonable agreement with the experimental observations. Moreover, for multiple ion temperature gradient modes in transport barriers, particle transport calculated from the gyrokinetic quasi-linear turbulent model compares with the result based on the quasi-linear mixing length estimations [1].

References

[1] M. K. Han, Z. X. Wang, J. Q. Dong and H. R. Du, *Nucl. Fusion* **57** (2017) 046019