

Turbulent Impurity Transport of Electrostatic Drift Waves in Toroidal Plasmas

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Abstract

Experiments in tokamaks show that, in addition to neoclassical transport, small-scale turbulence induced by drift instabilities plays a significant role in particle transport [1-3]. In recent experiments on HL-2A, Tore Supra *et al.*, it is found that the experimental threshold (especially the critical gradients) is in well agreement with the one calculated with quasi-linear gyrokinetic model [4]. Meanwhile, it is well known that the impurity problem is of great importance since even a small quantity of impurity strongly enhances the radiation loss and leads to the dilution of plasma reactivity [5-6].

In order to investigate the turbulent impurity transport of electrostatic drift waves, the quasi-linear particle transport is considered in the toroidal gyrokinetic integral code HD7. Detailed analyses about the dependence of particle flux on plasma parameters, especially the gradient thresholds are performed. Comparing various electrostatic drift instabilities, it is shown that the impurity transport induced by impurity particles is of great significance and the impurity effects are expected to have significant influence on plasma transport and confinement.

References

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