

TUTORIAL

Interplay of turbulence, collisional and MHD transport processes.

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The question of impurity transport has gained a renewed interest with the decision to implement plasma facing components made of tungsten in several tokamaks, in view of a future implementation in Iter. Furthermore Helium will be produced in Iter by fusion reactions, and other impurities will come from edge plasma seeding. It turns out that impurity transport is a paradigmatic case where neoclassical and turbulent processes may not be additive, as usually assumed. Candidates for breaking the separability assumption are profile corrugations, poloidal asymmetries and shear flows. Moreover, MHD non linear processes such as sawteeth crashes or island profile flattening also affect particle transport. Profile relaxations due to MHD events do compete with collisional and turbulent particle transport. This synergy may come from the interaction between convective flow cells of various sizes or the modification of neoclassical transport because of helical magnetic perturbations. This overview will present the reasons why the common assumption of additivity of turbulence, collisional and MHD transport processes may fail. It will be illustrated by gyrokinetic and non linear MHD simulations that include neoclassical effects. Consequences for other transport channels will also be discussed.