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Influence of Boundary Conditions on Turbulent Transport and Plasma Energy Confinement Time Evolution in Tokamaks with Additional Heating: Simulations for T-10 and T-15 Tokamaks

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Temporal evolution of anomalous transport and global plasma energy confinement time is studied in simulations of plasma turbulence in tokamaks with additional plasma heating. The simulations have shown that external boundary conditions with the specially chosen power dependence of heat fluxes on the local time-dependent values of plasma density and temperatures at the boundary of plasma core with SOL region can provide the evolution of the plasma confinement time to the known steady state plasma confinement scalings. Such boundary conditions can be interpreted as the corresponding power scaling for an effective plasma confinement time in SOL. The first set of simulation runs were performed for conditions of experimental shots at T-10 tokamak using CONTRA-C code (cylindrical geometry). The second set of simulations were performed both for T-10 experimental shots and for expected T-15 conditions using transport code ASTRA with special turbulent block CONTRA-A (toroidal geometry with non-circular plasma cross-section). Both codes are based on adiabatically reduced MHD-like equations of turbulent convection.

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