Confinement improvement triggered by the impurity injection in T-10 ECR heated plasmas

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Effect of the increase of the central electron temperature triggered by the Neon injection in T-10 was observed for the first time in discharges with ECRH/ECCD (EC current drive in co-direction to the total plasma current). Time evolution of the typical discharge is presented in Figure 1 in comparison with the discharge without Ne puffing. Increase of the electron temperature, plasma density and plasma energy content due to the impurity injection is clearly seen. Experiments were carried out at moderate edge safety factor value q_L~3. Toroidal magnetic field was changed in the range of B_T=2.42…2.18 T, which led to the shift of the EC resonance position from the center to the high field side, ~a/2 (a- minor radius). The phenomenon was observed in regime with slightly off-axis ECRH/ECCD, B_T~2.25 T, when the ECR power was absorbed in the vicinity of q=1 position and sawtooth oscillations were suppressed. Destruction of the improved confinement is linked to the odd MHD mode development (most possibly m=1 mode). Dependence of the value of the temperature gain on the ECCD power has been investigated. Confinement improvement seems to be a result of interplay between core current profile redistribution (with the increase of the gap between resonance surfaces in vicinity of the q=1) and the increase of radiation losses from the edge due to the Ne puffing.

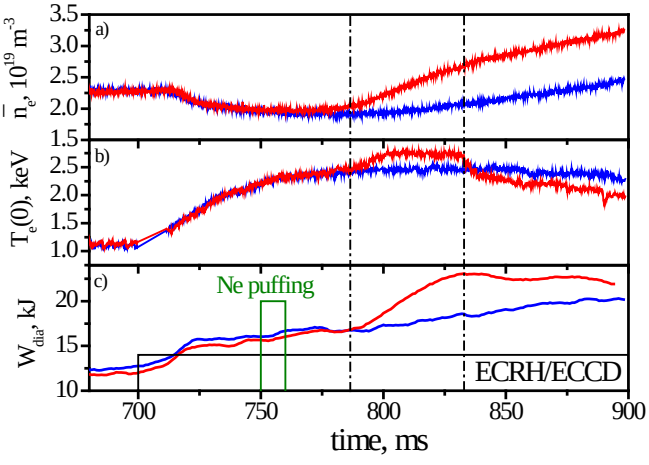

Figure 1. Time evolution of the electron density (a), central electron temperature (b) and plasma energy content (c) in similar T-10 discharges with (red curves) and without (blue curves) Neon puffing. Time and duration of Ne puffing and ECRH/ECCD are presented in subplot (c).

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