Non-local reduction of the electron heat flux and changes in impurities transport in certain T-10 experiments with W-limiter

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The new phenomenon has been found in some shots with W-limiter (and Li-coating) in the plasmas with two EC-beams with power injected in opposite directions under approximately equals toroidal angles and EC-power 1.5 MW. The spontaneous rise of the electron density nearly in the all plasma column occurs simultaneously with the rise of T_e in the wide region ($0<r/a<0.8$). We treat it as "global L-H transition" found earlier at JET [1] and in various regimes of JT-60U [2-3] or as "global ITB-event (e.g. see [3] and references therein) simultaneous with usual L-H transition". The value of D-beta falls, the positive value of dW/dt appears and the value of the energy confinement time τ_E abruptly rises by ~15%. The absolute value of the electron heat and density fluxes reduces abruptly in the whole plasma column. Later on, the value of τ_E gradually rises along with the density. The accumulation of tungsten and light impurities is absent. In some of the similar shots clear transition did not occur and the value of τ_E rises along with the rise of the density during longer time interval of ECRH/ECCD up to the level reached in the shots with the transition.

ITB-events occur also after falling of Li drop into the plasmas with ECRH/ECCD with various toroidal angles and the reduction of the electron heat flux typically within $0<r/a<0.7$ similarly to that of observed after the injection of C_8H_8 small pellet at LHD plasmas with ECRH [4].

In OH T-10 discharges ITB-event occurs after cut-off of the gas puffing with an increasing high density (experiments of Dr V.A. Vershkov). In a contrast with ECCD cases reported above, impurities begin to accumulate simultaneously with the ITB-event both in the case C-limiter and W-limiter.

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[1] Neudatchin S V, Cordey J G and Muir D J 20th EPS Conf. on Control. Fus. and Plasma Phys. (Lisboa,) vol. I (Geneva : EPS), p 83 (1993)

[2] Neudatchin S V, Takizuka T et al., Japan J. Appl. Phys. 35 3595 (1996)

[3] Neudatchin S. V., Takizuka T., et al., Plasma Phys. Control. Fusion 44 A383-389 (2002)

[4] Tamura N., et al., Phys. of Plasmas 2005 **12** 110705