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P5.1085 Tungsten core transport in 30s WEST L-mode plasma with RF heating

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W (Tungsten) accumulation in the core plasma could cause largely increased radiation because of its high cooling rate, which severely restricts long-pulse operation. In this context, WEST has achieved 30s L-mode pulses without any sign of W accumulation. The discharges were performed on the upper divertor in a full W environment, with LHCD power reaching 2.8MW and a constant central line-integrated electron density of 3.2x10^19m^-2. The radiated power was 50% of the total RF heating power and this fraction remained constant over 30s.
To explain why there is no W accumulation in these long pulses, core W transport is analyzed. Based on the experimental analysis, within ρ <0.4, a proxy of the W peaking is correlated to the proxy of neoclassical pinch to diffusion ratio, R/Lne - 0.5 R/LTe [1], hence the neoclassical convection plays the dominant role. The impurity content is reconstructed using METIS [2] constrained thanks to iterations with synthetic diagnostics for SXR, bolometer and Bremsstrahlung emission. The respective core W transport contributions: turbulent vs neoclassical and diffusion vs convection, are obtained thanks to NEO [3] and QuaLiKiz [4].
In addition, in these long pulses, during the phase of N2 seeding which is used to investigate the ammonia production, an increase of the core temperature was measured. The mechanism of this improvement is investigated using METIS and QuaLiKiz.

[1] Angioni C et al, Nucl. Fusion 2014
[2] Artaud J.F et al, Nucl. Fusion 2018
[3] Belli E et al, Plas. Phys. and Cont. Fus. 2012
[4] Bourdelle C et al, Plas. Phys. and Cont. Fus. 2016

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