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P2.1081 Ion heat channel at the L-H transition in JET-ILW

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During the last decades, the transition from low to high plasma confinement (L-H transition) has been analysed in several tokamaks showing that the L-H power threshold depends non-linearly on plasma density. A common finding shown both for AUG and C-mod experiments, with different mixes of heating systems, [F. Ryter et al. 2014 Nucl. Fusion 54 083003], [M. Schmidtmayr et al. 2018 Nucl. Fusion 58 056003] is that there is minimum in density for the L-H power threshold, with the power to the ion channel increasing monotonically with density. At JET, after the installation of the ITER-like wall (ILW), the L-H power threshold shows a minimum, or in some cases a flattening, in density, and the corresponding minimum density depends on the plasma shape [C. Maggi et al. 2014 Nucl. Fusion 54 023007], [J. Hillesheim et al., 2018, 27th IAEA Fusion Energy Conference, Ahmedabad, India]. The aim of the present work is to characterize the L-H transition in terms of power balance analysis (in particular regarding the ion heat channel) for a selection of JET-ILW discharges having the same toroidal field and plasma current but different plasma shape. We restricted the analysis to Neutral Beam Injection (NBI) only-heated discharges, with strong ion heating, divided in 2 datasets depending on the divertor configuration. The power crossing the separatrix at L-H transition has been calculated by integrated modelling with JETTO simulations using ASCOT code for NBI modelling. Due to the lack of core Ti measurements, predictive QuaLiKiz core transport simulations have been run, then validated against the available measurements, and finally used to estimate the thermal exchange power between electrons and ions. The resulting power balance indicates that, for the discharges analysed, the ion heating is dominated by direct NBI heating, and, at L-H transition, the total ion heat flux is not proportional to density. This was also the case for the subset of NBI-heated pulses in AUG.

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