Plasma confinement at JET

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Operation with a Be/W wall at JET (JET-ILW) has an impact on scenario development and energy confinement with respect to the carbon wall (JET-C). The smaller tolerable impurity concentration for W ($<10^{-5}$) requires the tailoring of plasma parameters and the use of electron heating methods to prevent W accumulation in the plasma core region. Two key areas have been investigated as a possible explanation of the differences observed in the pedestal between JET-C and JET-ILW: the effect of W in the core plasma and the interaction of the plasma with the edge through the increase of neutral pressure and recycling. ICRH heating can control W accumulation in the plasma core by reducing the neo-classical inward pinch of W. However, keeping W concentration in the core below the critical level to achieve stationary plasmas requires a sufficient level of gas injection rate. The pedestal temperature decreases and with it the core confinement. Nitrogen injection recovers confinement partially; increasing additional input power at low gas fuelling, increases the pedestal temperature giving access to high β_N where the favorable power dependence of the pedestal confinement leads to an improved global confinement; at constant power the increased particle pumping leads to a pedestal temperature increase and peaking of the core density. An improvement in confinement with decreasing collisionality is also observed. The increase of the range in I_p is to understand the dependencies of confinement with the dimensionless parameters ρ^* and ν^*. Single parameter scalings indicate that confinement improvement with decreasing ρ^* is smaller than expected from the Gyrobohm scaling, similar to that found at high current (>3MA) in the JET-C. On this basis, performance of future DT discharges can be assessed in the light of the recent results taking also into account the role played by the fast ion population in improving core energy confinement.