Effect of the divertor geometry on the pedestal confinement in JET-ILW

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\textsuperscript{*} See the Appendix of F. Romanelli et al., Proceedings of the 24\textsuperscript{th} IAEA Fusion Energy Conference 2012, San Diego, USA

The baseline type I ELMy H-mode scenario has been re-established in JET with the new tungsten divertor and beryllium-main wall (JET-ILW) in 2011. In comparison with carbon wall (JET-C) discharges in similar conditions, a degradation of the confinement has been observed, with the reduction mainly driven by a lower pedestal pressure [1]. The causes of the pedestal degradation are not clear yet and are currently under investigations. Some of the main possibilities are a difference in the pedestal stability (possibly driven by the different impurity content between JET-C and JET-ILW) and/or a difference in the recycling flux in the divertor area.

This work investigates the effect of the magnetic configuration in the divertor region on the pedestal structure, pedestal confinement and ELMs. A set low triangularity H-mode discharges have been performed using the same gas fuelling and the same NBI power (two power levels, 16MW and 23MW) with similar core shape but changing the strike position relative to the pump throat. The confinement varies from $H_{98} \approx 0.7$ to $H_{98} \approx 0.9$, with the highest confinement obtained in the corner configuration, where the outer strike is closed to the pump. For the low power level, the electron pedestal temperature is not significantly affected by the divertor configuration ($T_{e}^{\text{ped}} \approx 0.7$keV) and the difference in the confinement is mainly driven by the electron pedestal density. For the high power level, the corner configuration has 20-30\% higher electron pedestal pressure (due to both higher $T_{e}^{\text{ped}}$ and higher $n_{e}^{\text{ped}}$) and higher ion pedestal temperature than the discharges with the strike point away from the pumping throat.

The corner configuration is also characterized by small ELMs with energy losses $\Delta W_{\text{ELM}} \approx 0.2$MJ and temperature collapses $\Delta T_{e}^{\text{ped}} \approx 0.3$keV, while the configuration with the lowest confinement is characterized by large ELMs, with energy losses up to $\approx 0.4$MJ and large temperature collapses ($\Delta T_{e}^{\text{ped}} \approx 0.6$keV).

This work also investigates the correlation between the pedestal confinement and the changes in the recycling for the different divertor geometries [2].