# Experimental analysis of ELM and inter-ELM particle transport in JET-ILW pedestals

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Understanding pedestal physics is essential to predict and optimise plasma performance in current and future tokamak experiments. Reduced pedestal models have proven successful in predicting the pedestal pressure for a wide range of plasma scenarios [1,2,3], but they lack a predictive model for the edge density. Prediction of the density pedestal requires understanding of the interplay between edge sources, pedestal stability, ELM and inter-ELM transport. Recently, JET-ILW type I ELMy H-modes at 2.5MA/2.8T with constant NBI heating (23 MW) and gas fuelling rate were performed, utilising ELM pacing by vertical kicks [4] and plasma shaping (triangularity, δ) as tools to disentangle the effects of ELM, inter-ELM losses and edge stability on the pedestal particle balance.

In agreement with previous studies [5,6], the pedestal confinement improves with increasing δ, mostly due to a significant increase in pedestal density, and the ELM frequency ($f_{ELM}$) is decreased. Detailed analysis of high resolution profile reflectometry data shows that the ELM particle losses also increase from low to high δ, implying that ELM particle losses play a minor role in setting the higher pedestal density in these high δ plasmas. Interpretative EDGE2D-EIRENE [7,8] simulations confirmed that the particle losses in the pedestal are predominantly by inter-ELM transport. In one high δ plasma, $f_{ELM}$ was increased with vertical kicks to match the natural ELM frequency of the low δ counterpart at same input power and gas rate. With vertical kicks, the ELMs are triggered before the pedestal would naturally reach the MHD stability limit. Although this imposed degradation of pedestal stability leads to a 12 % reduction in pedestal density, the pedestal density is 37 % higher than that of the low δ case. This implies that increased plasma triangularity reduces inter-ELM particle transport, and thus leading to increased pedestal confinement.

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