

The EUROfusion JET-ILW pedestal database

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To enhance the scientific output of multi-machine comparisons, EUROfusion has promoted the creation of several databases with common definitions and with a common platform. This work is an overview of the EUROfusion pedestal database of JET-ILW.

The definitions of the pedestal quantities have been agreed among the EUROfusion machines AUG, JET-ILW, MAST-U and TCV, allowing future consistent multi-machine comparisons and scaling laws. The databases will be stored into the IMAS format (ITER integrated modelling and analysis suite) [1].

The JET-ILW pedestal database contains all the JET-ILW H-mode plasmas with stationary phases at least 0.5s long (longer than $\approx 2\tau_E$) and with good Thomson scattering data. The pedestal structure is determined using the pre-ELM profiles of the High Resolution Thomson Scattering [2] processed as described in [3]. From the point of view of the pedestal structure, the main parameters stored are: (i) height, (ii) width (iii) position of the maximum gradient, and (iv) maximum gradient of electron density, temperature and pressure, (v) separatrix density and (vi) normalized pressure gradient. Pedestal parameters are extracted by fitting the experimental data with both a *mtanh* function [4] and a combination of linear functions. In the JET-ILW database, the two fitting functions produce qualitatively similar results.

Version 1 of the JET-ILW database contains the discharges till the C37 experimental campaign (end of 2016) with a total of ≈ 1200 entries. Figure 1 shows the scatter plot of T_e^{ped} and n_e^{ped} in version 1. The database will be kept up to date.

To complement the experimental data, the JET-ILW database contains the results of the peeling-ballooning stability analysis. This was done by self-consistent runs of ELITE [5] (using the bootstrap current from the Sauter model [6]), which provide the normalized pressure gradient α_{crit} and the temperature T_e^{crit} expected by the P-B stability.

The present work discusses both the technical aspects of the database (such as parameters definition and workflow) and the preliminary analysis, with particular emphasis on the comparison between experimental results and P-B stability predictions.

References

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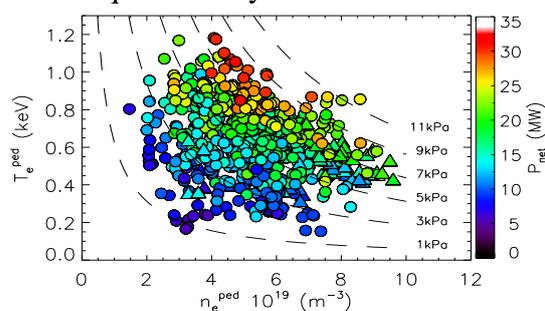


Figure 1. Pedestal temperature and density for the deuterium unseeded plasmas of the EUROfusion JET-ILW pedestal database (version 1). Colors highlight the total input power. Circles: low- δ plasmas ($\delta < 0.25$). Triangles: high- δ plasmas ($\delta > 0.25$).