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EX/P4-02: Analysis of Temperature and Density Pedestal in a Multi-machine Database

Wednesday, 10 October 2012 14:00 (4h 45m)

A pedestal database was built using data from type-I ELMy H-modes of ASDEX Upgrade, DIII-D and JET. Edge data from high resolution diagnostics was analysed directly before an ELM crash. In this phase reproducible conditions are expected which lead to the type-I ELM crash. The pedestal is characterized in terms of pedestal top, width and gradient. These parameters are determined with the same procedure for all three machines. For the analysis a database approach was chosen where discharges from all machines were collected to cover a wide range of plasma current, magnetic field, plasma pressure and shape.
Three main topics are addressed with the database: the pedestal width of electron temperature and electron density; the pedestal top of the electron pressure; and the gradient lengths of temperature L_Te and density L_ne, including their ratio eta_e=L_ne/L_Te.
The pedestal width of temperature and density scale differently in the presented database. The scalings predict that in ITER the temperature pedestal will be appreciably wider than the density pedestal. The pedestal top of the electron pressure shows a linear correlation with the pedestal pressure gradient in real space.
The gradient length ratio eta_e in the pedestal was found to vary systematically from around 1 at high to over 2 for low collisionality. At low triangularity L_Te in the pedestal can be changed with variation of the heating power, independently of the density gradient length. For high collisionality eta_e approaches unity regardless of the applied heating power.

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