

Automatic analysis of pedestal confinement degradation induced by ELMs

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ABSTRACT

When the power injected into Tokamak plasmas is above a certain threshold (and the right conditions are met), the plasma confinement moves from the L-mode to the H-mode of confinement. One of the most important characteristics of the H-mode is the existence of a transport barrier at the edge of the plasma that is known as external transport barrier (ETB). The ETB appears in the plasma temperature and density profiles as a high steep gradient close to the plasma edge. Edge Localized Modes (ELMs) are instabilities at the plasma edge of H-mode plasmas. At each ELM burst, the ETB is reduced and the plasma confinement degrades.

This paper describes an automatic technique to analyse the plasma electron temperature profiles in H-mode to recognize and quantify the plasma confinement degradation. The technique has been applied to analyse the pedestal evolution in ELMy regimes. The temperature profile during each ELM is compared to the temperature profile 2 ms before. The difference of the temperatures in the ETB is used to quantify the deterioration of the plasma confinement. The technique has been applied to a JET database containing hundreds of pulses.