TRANSPORT ANALYSIS OF MULTI-PHASE H-MODE SHOT AT TCV

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The Tokamak à Configuration Variable (TCV) is well suited for studies of electron transport due to its well developed electron cyclotron resonance heating (ECRH) system. Ion heating can be achieved through thermal equilibration in high density plasmas. Such plasmas can be heated by the third harmonic X-mode (X3), which allows for H-mode studies with strong electron heating. In the discharge analyzed here, TCV shot 29892, X3 heating was applied to an ohmic ELMy H-mode[1]. The first phase, with full X3 power, exhibits large ELMs and significant sawtooth activity. The power is then modulated and the plasma undergoes a transition to a stationary ELM-free H-mode phase where the confinement stays high. After a minor disruption, MHD is present and the confinement decays while maintaining the stationary ELM-free regime. Therefore, this shot comprises four different H-mode phases to be analyzed and compared, one ohmic followed by three with strong electron heating. The two final phases are similar to improved H-mode regimes.

The transport analysis is carried out with ASTRA. As sawteeth are present, to different degrees, throughout the shot, the sawtooth model is activated to adjust the q-profile accordingly. The GLF transport model is included in the interpretative mode to investigate the differences in the growthrates of the main microinstabilites, the diffusion coefficients and the overall confinement in the four distinct H-mode intervals.

1. L. Porte et al., Proceedings of 21st IAEA Fusion Energy Conference, EX/P6-20