

Features of spontaneous and pellet-induced ELMs on the HL-2A tokamak

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Abstract

The pellet pacing ELM mitigation concept is being tested in some tokamaks such as ASDEX Upgrade, DIII-D and JET. By increasing the ELM frequency, the ELM size can be reduced and eventually suppressed to meet the lifetime requirements on ITER target plates. In the HL-2A tokamak, ELMy H-mode operation is routinely performed and small type-III ELMs with a high repetition rate and some type-I (or possibly large type-III) ELM events are observed. Large ELMs are often preceded by strong coherent magnetic oscillations, and produce obvious perturbations on plasma current I_p , electron density \bar{n}_{edge} at the edge, stored energy W_E , etc. The coherent magnetic oscillations before an ELM crash or during the ELM are measured by toroidal and poloidal Mirnov coils and analysed by the wavelet technique to study the spectral characteristics of the short time ELM events. Pellet injection experiments are performed in type-III ELMy H-mode plasmas and ELM-free H-mode plasmas to study the physics of pellet triggering ELM. The analyses of pellet-induced ELMs and spontaneous ELMs are presented. Because the pellet size is relatively large, it induces magnetic oscillations lasting longer than that of a natural ELM.

(Some figures may appear in colour only in the online journal)