

A comparison of the spatial and temporal structure of type-I ELMs

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Filamentary structures have been observed during ELMs on most devices. Although it is clear that these structures exist during the ELM it is still unclear what parameters determine their size and how they propagate. It is important to remove this uncertainty in order to predict the amount of energy to, and its distribution on, the first wall in future devices. In order to calculate these parameters the amount of energy in the filament at the time of detachment, the time for the filament to reach the wall and the size of the filament need to be determined. In this presentation a comparison of the evolution, radial extent and spatial structure of type-I ELMs on a range of devices will be presented. The radial extent of the ELM efflux is clearly related to the radial velocity of the filaments and it is known that there is a difference in the radial extent on some devices. For example, the ELM efflux extends up to 10 cm from the plasma edge on ASDEX Upgrade and up to 20 cm on MAST. In order to understand what physics determines the radial acceleration of the filaments and in turn the radial extent of the filaments, a study of the relevant edge parameters will be presented. The filament size determines the region of interaction with the first wall, by comparing the measured filament size on various devices a scaling can be determined for future devices. Finally, the density and temperature of filaments have been measured using Thomson scattering on several devices. This can be used to calculate the energy content of the filaments at the time of detachment. These combined observations will be used to confront the predictions of various models and the consequences for first wall interactions on ITER will be discussed.

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