

Parameter space of low frequency inter-ELM modes

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The ELM cycle of type-I ELMs consists of different phases characterized by the evolution of kinetic profiles on different time scales [1] and distinct MHD and turbulence activity. In the latest phase of the ELM cycle, the pressure gradients are clamped. During this phase low, medium and high frequency MHD modes develop simultaneously in the steep gradient region [2]. The high frequency modes are located at the minimum of the E_r well, and are measured as fluctuations in the radial magnetic field on both, low and high field side [3].

In this work, the low frequency modes are studied. They are measured only at the low field side located further inwards, towards the pedestal top. They appear as fluctuations in the electron density, the electron temperature and as magnetic fluctuations [4]. These modes rotate poloidally in the electron diamagnetic direction with the velocity of the background flow at that position. The frequency of low frequency modes is inversely proportional to the input power.

In order to fully characterize the low frequency modes and correlate them with the pedestal evolution pattern during an ELM cycle, this work focuses on exploration of the range of parameters where these modes appear. This involves the extension of the dependence on input power and scan in the edge safety factor. Different collisionality regimes are also assessed. To identify the nature of the fluctuations, we use the newly installed He-line ratio diagnostics at ASDEX Upgrade that measures simultaneously electron density and electron temperature in the plasma edge. The phase relation between the two is compared with n-T phase measurements from reflectometer and correlation electron cyclotron emission diagnostics [5].

References

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