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Simultaneous Measurement of the ELMs at Both High and Low Field Sides and ELM Dynamics in ELM Crash-Free Period in KSTAR

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Following successful characterization of the growth, saturation and bursting process of the Edge Localized Mode (ELM) by a 2D/3D Electron Cyclotron Emission Imaging (ECEI) system in KSTAR H-mode plasmas, the observed mode structure is verified via synthetic image reconstruction based on the BOUT++ code. In successive KSTAR campaigns, a wide range of toroidal mode numbers ($-4 < n < \sim 6$) of the ELMs have enabled the establishment of the relationship between the poloidal and toroidal mode numbers (m, n) through the local magnetic shear (safety factor - q) ($< m > = nq$). ELM dynamics observed simultaneously at both high and low field sides revealed necessity of the Pfirsch-Schlüter flow, shear suppression of high n modes and inconsistency in mode numbers suggested further study. In KSTAR campaigns, Magnetic Perturbation (MP) coils with $n=1$ and $n=2$ structures successfully suppressed the ELMs. In the ELM suppressed period, persisting mode structures accompanied with weak bursting behaviours were observed.

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