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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) [1] 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 < ~16) 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 Pfirsh-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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Author: Mr PARK, Hyeon (Republic of Korea)

Co-authors: DOMIER, C.W. (UCD); Prof. YUN, Gunsu (POSTECH); Ms LEE, J.E. (POSTECH); Mr LEE, Jaehyun (POSTECH); CHOI, Minjun (POSTECH); Mr KIM, Minwoo (POSTECH); Dr LEE, S.G. (NFRI); Dr YOON, S.W. (NFRI); Prof. LEE, W. (POSTECH); Dr XU, X.Q. (LLNL); Dr JEON, Y.M. (NFRI); Prof. LUHMANN, JR., nevelle (UCD)

Presenter: Mr PARK, Hyeon (Republic of Korea)

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