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Successful ELMSuppressions in a Wide Range of q_{95} Using Low n RMPs in KSTAR and its Understanding as a Secondary Effect of RMP

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As the most plausible technique to control the edge localized modes (ELMs) of high confinement mode (h-mode) plasmas, which is critical for ITER and beyond, non-axisymmetric resonant magnetic perturbations (RMPs) have been actively investigated in KSTAR. Since the first success of ELM suppression using $n=1$ RMPs in 2011 [1], our effort has been devoted to extend the operation regime of ELM control for both external magnetic configurations and plasma parameters. As results, it shows a possibility that the ELM-suppression can be achieved in a wide range of q_{95} ($\approx 3.5\sim 6.5$) if the RMP field is configured properly. Several unique features of RMP-driven ELM-suppression are found, by which the physics mechanisms of ELM suppression and mitigation can be explicitly distinguished. These are a long time delay (a secondary effect) and an improved confinement (transport bifurcation). Furthermore, a persistent, rapidly repeating bursty event, localized in the plasma edge, is observed and suggested as a key player in the underlying physics mechanism of RMP-driven ELM-suppression.

[1] Y.M. Jeon et al., Phys. Rev. Lett. 109, 035004 (2012)

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