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Nonlinear MHD Modeling of the Effect of n=2 RMP on Peeling-Ballooning mode in KSTAR SANGKYEUN KIM, YONGSU NA, Seoul National University, STANISLAS PAMELA, CCFE, OHJIN KWON, Daegu University, MARINA BECOULET, GUIDO HUIJSMANS, CEA, YONGKYOON IN, UNIST, JAEHYUN LEE, MINWOO KIM, NFRI — To suppress edge-localized-modes (ELM) via resonant magnetic perturbation (RMP) is critical to reach and sustain high-performance steady state H-mode plasmas. Using the nonlinear 3D MHD code JOREK [1], we have successfully simulated a recent n=2 RMP-driven ELM-crash-suppression in KSTAR. In this study, we have found that such ELM-crash-suppression has been not only attributable to degraded pedestal but also to direct coupling between peeling-ballooning mode (PBM) and RMP-driven plasma response. Specifically, the pedestal pressure gradient was reduced, since radial transport was enhanced due to the formation of the stochastic layer and kink-peeling response (KPM) [2] driven by RMP. While the linear stability of PBM improved owing to the degraded pedestal, it was not a sole contributor to ELM-crash-suppression, in that the other nonlinear mode coupling should be simultaneously taken into account. This outcome is consistent with the previous studies [2, 3]. In addition, the locking of PBMs has been numerically simulated during the ELM suppression phase, which may support the relationship between $V_{ExB} \approx 0$ at the pedestal and the onset of ELM-crash-suppression. [1] G. T. A Huysmans et al., PPCF (2009) [2] F. Orain et al., Phys. Plasma (2019) [3] M. Becoulet et al., PRL (2014)

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