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**Nonlinear interaction between edge-localized modes (ELMs) and edge turbulence during ELM-crash-suppression phase under n=1 RMP<sup>1</sup>**

JAEHYUN LEE, UNIST, GUNSU YUN, POSTECH, MINJUN CHOI, JAE-MIN KWON, YOUNG-MU JEON, WOOCHANG LEE, NFRI, NEVILLE C. LUHMANN, JR., UC Davis, HYEON K. PARK, UNIST — Mutual interactions between edge-localized modes (ELMs) and turbulent eddies have been investigated in 2-D by using the KSTAR electron cyclotron emission imaging (ECEI) system. ECEI shows that ELM filaments still exist in the edge when the usual large scale collapse of the edge pedestal, i.e., the ELM crash, is completely suppressed by  $n = 1$  resonant magnetic perturbation (RMP). Correlation analysis among ECEI channels reveals that the RMP enhances turbulent fluctuations in the edge and that ELM crashes are suppressed when the RMP exceeds a certain threshold. The spectral power distribution of turbulence shows a clear dispersion for a wide range of wavenumber ( $k_\theta < 1 \text{ cm}^{-1}$ ) and frequency ( $f < 70 \text{ kHz}$ ). The radial velocity and ECE intensity fluctuations of the turbulent eddies are approximately in-phase and thus the turbulence involves a net radial energy transport. Bispectral analysis indicates the coexisting ELMs and turbulent eddies nonlinearly interact with each other. Both the enhancement of radial transport and the nonlinear interaction with ELMs may be the key to the physics mechanism of ELM-crash-suppression by low-n RMP.

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