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Direct Destabilizations of Macro/Micro Edge Instabilities by Magnetic Perturbations

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It has been regarded that magnetic perturbation (MP) by non-axisymmetric fields is the most promising technique in controlling edge localized mode (ELM) crashes that are potentially harmful to the lifetime of first wall in reactor scale devices. However, the exact mechanism of MP has not been fully understood in both ELM crash mitigation and suppression. Here, we investigated the characteristics of macro and micro edge instabilities in relation to MP during ELM crash controlled discharges of KSTAR. Especially, the MP turning-off periods were focused in order to rule out the effect of pedestal evolution. As a result, it was found that the response of macro and micro edge instabilities is very prompt against the applied MP. It suggests that the MP could directly drive macro and also micro instabilities of edge plasmas otherwise the discharge was stable against them. The detailed analyses are still on-going with local fluctuation measurements and numerical/theoretical efforts to reveal the underlying features of MP-driven edge instabilities.

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