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Distinct features of edge-localized RMP and its application to drive more intelligent RMP[1] S.M. YANG, J.-K. PARK, N.C. LOGAN, C. ZHU, Q. HU, PPPL, Y.M. JEON, NFRI, Y. IN, UNIST, W.H. KO, G.Y. PARK, NFRI, S.K. KIM, Y.S. NA, SNU — The application of RMP is one promising way to control ELM, which is the potential challenge of tokamak reactors. On the other hand, the RMP can also drive the core response that could lead to devastating instabilities. A systematic approach can isolate the edge from core resonant fields for safe ELM suppression, and give edge-localized RMP. A robust feature of the edge-localized RMP is the curtailed response to the field at the LFS midplane, as opposed to typical RMPs which strongly resonate with the LFS fields. Sensitivity studies in various target plasmas justify this robust feature, for both n=1 and n=2 toroidal modes. This improved understanding of edge localized resonant RMPs has been then utilized to explore optimizations of the 3D coils. We propose an efficient way to probe the accessibility of RMP ELM suppression with given target plasmas and engineering constraints. The optimization proposes the unconventional 3D coil parameters in KSTAR implying that more intelligent RMP is possible. This new insight is also utilized for the design of ELM control coils to enhance the efficiency of our ELM suppression capabilities. Simple window-pane coils matching the edge-localized RMP structure can substantially expand in the ELM suppression window beyond the existing coil. Further optimization using the FOCUS code leads to additional enhancement in the edge-localized control

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