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Theory Experiment

A Possible Connection of Plasma Response to RMP ELM Suppression in DIII-D,* A. Wingen, M.W. Shafer, E.A. Unterberg, D.L. Hillis, *ORNL*; N.M. Ferraro, T.E. Evans, P.B. Snyder, *GA* – A hypothesis of a possible relation between the so-called kink-response, a flux surface oscillation which is driven by amplification of non-resonant components of the resonant magnetic perturbation (RMP) spectrum, and the re-appearance of edge localized modes (ELMs) in the presence of RMPs is presented. Several DIII-D discharges with different responses show that those with stronger kink-response are closer to the peeling-ballooning stability limit and eventually cross into the unstable region, causing ELMs to re-appear. Simulations of the magnetic topology for all cases are compared. The topology consists of a kinetic equilibrium reconstruction, the RMP fields and a linear plasma response, calculated by resistive, 2-fluid MHD. It is found that the kink response is correlated to the edge current density while screening/amplification of resonant field components is related to flows. A transition from a tearing dominated edge to a kink dominated edge is demonstrated. A kink dominated discharge with intermittent ELMs is found to be marginally unstable in an ELITE simulation while ELM suppressed, tearing dominated discharges are inside the stability limit.

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