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Edge Stability in ELM-free QH and RMP Plasmas[1] P.B. SNYDER, K.H. BURRELL, M.S. CHU, T.H. OSBORNE, General Atomics, H.R. WILSON, U. of York, C. KONZ, IPP Garching — The peeling-ballooning model proposes that intermediate wavelength MHD instabilities cause edge localized modes (ELMs) and impose constraints on the pedestal height. In typical discharges, the pedestal goes unstable to coupled peeling-ballooning modes shortly before an ELM is observed. However, in ELM-free discharges, such as in the promising Quiescent (QH) and resonant magnetic perturbation (RMP) H-mode regimes, the edge collisionality is low, and the resulting large bootstrap current in the pedestal region drives kink/peeling modes ($n \sim$1-10). Both flows and the conducting wall have significant impact in this regime, and an edge localized resistive wall mode can be unstable. We present a theory for the occurrence of QH-mode, in which the observed edge harmonic oscillation (EHO) is a saturated low-n kink/peeling mode, which drives particle transport and allows a steady quiescent pedestal. In RMP discharges, we find that the imposed magnetic perturbation plays the role of the EHO, similarly allowing steady state quiescent discharges.

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