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The effects of weakly 3-D equilibrium on MHD stabiliyt of tokamak pedestals[1] C.C. HEGNA, University of Wisconsin, Madison, WI 53706 — The stability of MHD modes is evaluated in the presence of an equilibrium perturbed by a topology-preserving 3-D distortion. The theory employs a perturbation approach assuming that the 3-D amplitude is small. In general, the 3-D distortion is destabilizing as it lowers the critical conditions for instability for the least stable mode. The theory is specialized to the MHD stability of pedestal modes in the presence of shielded RMP fields. Previous work has demonstrated that local MHD stability properties (and hence microinstabilities) can be significantly altered by the presence of applied 3-D fields [1]. In this work, we expand these calculations in an effort to address whether RMP fields can affect 'global' peeling-ballooning modes. For this application, the dominant 3-D modification is due to the localized resonant current responses at rational surfaces. These localized currents couple harmonics with different toroidal numbers and produce an MHD eigenmode with multiple toroidal harmonics. The physics of how the localized current structures affect the MHD stability of tokamak pedestals will be discussed.

[1] T. M. Bird and C. C. Hegna, *Nucl. Fusion* **53**, 013004 (2013)

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