Abstract Submitted
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Shaping Effects on Resistive-Plasma Resistive-Wall Mode Stability in a Tokamak[1] DOV RHODES, A.J. COLE, G.A. NAVRATIL, J.P. LEVESQUE, M.E. MAUEL, Columbia University, D.P. BRENNAN, Princeton University, J.M. FINN, Tibbar Plasma Technologies, R. FITZPATRICK, University of Texas at Austin — A sharp-boundary MHD model is used to explore the effects of toroidal curvature and cross-sectional shaping on resistive-plasma resistive-wall modes in a tokamak. Building on the work of Fitzpatrick [1], we investigate mode stability with fixed toroidal number n=1 and a broad spectrum of poloidal m-numbers, given varying aspect-ratio, elongation, triangularity and up-down asymmetry. The speed and versatility of the sharp-boundary model facilitate exploration of a large parameter space, revealing qualitative trends to be further investigated by larger codes. In addition, the study addresses the effect of geometric mode-coupling on higher beta stability limits associated with an ideal-plasma or ideal-wall. These beta limits were used by Brennan and Finn [2] to identify plasma response domains for feedback control. Present results show how geometric mode-coupling affects the stability limits and plasma response domains. The results are explained by an analytic reduced-MHD model with two coupled modes having different m-numbers. The next phase of this work will explore feedback control in different tokamak geometries. Refs: [1] R. Fitzpatrick, Phys. Plasmas 17, 112502 (2010). [2] D. P. Brennan and J. M. Finn, Phys. Plasmas 21, 102507 (2014).

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