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The effect of strong radial variation of the diamagnetic frequency on two-fluid stabilization of edge localized MHD instabilities[1] TYLER COTE, CHRIS HEGNA, University of Wisconsin-Madison, PING ZHU, University of Science and Technology of China and University of Wisconsin-Madison — The conventional theory for two-fluid stabilization of ballooning instabilities in tokamaks assumes the diamagnetic frequency is constant throughout the radial structure of the ballooning mode. However, this approximation is not valid in the pedestal region where large density and temperature gradient variation is present. In this work, we apply WKB theory to solve for the radial structure of the ballooning eigenmode[2] in the presence of a radially varying diamagnetic frequency[3] for a class of MHD equilibria with edge pedestal regions. Generally, the radial variation of diamagnetic frequency reduces the stabilizing influence of two-fluid physics. Quantification of this effect will be presented for a number of equilibria. Future work will include comparisons of the ballooning theory with linear two-fluid calculations using the extended MHD code NIMROD.

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[2]R. L. Dewar et al, Nucl. Fusion **21**, 493 (1981)
[3]R. J. Hastie et al, Phys. Plasmas **7**, 4561 (2000)

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