

# Improved MHD Stability Through Optimization of Higher Order Moments in Cross-Section Shape of Tokamaks

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## *Abstract*

Optimization of the higher order moments — specifically the squareness — of a tokamak cross-section can significantly enhance the stability to ideal magnetohydrodynamic ballooning and kink modes. At conventional aspect ratios, it is shown that access to the second regime of ballooning stability is facilitated by moderate squareness. In a low aspect ratio, fully bootstrap current driven spherical torus, optimization of the squareness results in an increase in  $\beta$  of the order of 10%, leading to a configuration stable to ballooning, axisymmetric, and ideal  $n \leq 5$  kink modes at  $\beta \simeq 67\%$ .

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