Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

The effect of three dimensional flux surface shaping on ideal ballooning stability[1] TOM BIRD, CHRIS HEGNA, University of Wisconsin - Madison — An understanding of how 3-D shaping of MHD equilibria affects highly localized instabilities is an attractive goal for the optimization of non-axisymmetric magnetic confinement devices. The use of 3-D resonant magnetic perturbations to suppress edge localized modes in tokamak experiments also motivates a detailed study of the ballooning stability properties of nearly axisymmetric equilibria. Understanding the basic role of 3-D shaping is difficult due to the computational cost and complexity associated with the calculation of global 3-D MHD equilibria. Numerical implementation of local 3-D equilibrium theory is used to generate sets of equilibria where flux surface shape is explicitly specified by 3-D parametrizations. The effects of 3-D shaping on geometric quantities of interest to local mode stability is examined. Marginal stability diagrams are used to analyze ballooning stability properties of shaped stellarator equilibria and nearly axisymmetric tokamak equilibria. Implications for ELM properties in the presence of 3-D resonant magnetic perturbations will be discussed.

[1]Research supported by U.S. DOE under grant no. DE-FG02-99ER-54546.

Tom Bird
University of Wisconsin - Madison

Date submitted: 17 Jul 2010 Electronic form version 1.4