Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Effect of 3-D field perturbations on kinetic ballooning mode stability[1] C.C. HEGNA, Department of Engineering Physics, University of Wisconsin, T.M. BIRD, Max-Planck-Institut für Plasmaphysik, Greifswald, Germany — Applied resonant magnetic field perturbations can alter the plasma transport properties through three-dimensional modulations of plasma shaping parameters. This mechanism is viable even in the presence of shielding by plasma rotation. Using local 3-D equilibrium theory, shaped tokamak equilibria altered by small ($\delta B/B_0 \sim 10^{-3} - 10^{-4}$) 3-D distortions can be constructed. The ideal MHD ballooning mode stability limit is lowered in the presence of the 3-D field relative to the axisymmetric case due to 3-D modulations of the local magnetic shear [1]. In particular, Pfirsch-Schlüter currents driven by 3-D distortions of the geodesic curvature are produced that alter the local magnetic shear. These currents become large as the field pitch of the magnetic field line approaches a rational value. Since ideal MHD ballooning stability calculations are sometimes used as a proxy for kinetic ballooning mode onset, these calculations suggest 3-D flux surface distortion of sufficient magnitude can affect anomalous transport. In this work, analysis of the kinetic ballooning eigenmode equation is performed that accounts for the role of the 3-D equilibrium distortion.

[1] T. M. Bird and C. C. Hegna submitted to *Phys. Rev. Lett.* (2012).

[1]Research supported by U. S. DoE under grants DE-FG02-86ER53218 and DE-FG02-99ER54546.

C. C. Hegna
Department of Engineering Physics, University of Wisconsin

Date submitted: 06 Jan 2012 Electronic form version 1.4