Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Analytical theory of BAE gap modification due to a magnetic island[1] CARSON COOK, CHRIS HEGNA, University of Wisconsin, DONALD SPONG, Oak Ridge National Laboratory — The Beta-induced Alfven Eigenmode (BAE) gap is a break in the frequencies of the shear Alfven continuum. This gap is important because a discrete Alfven eigenmode can exist within the gap frequency range and will not be affected by continuum damping. In order for the BAE gap to appear, finite beta and curvature effects must be present. Under these conditions, there is a coupling between the equation for shear Alfven waves involving inertia and bending energy terms and the sound wave equation. The presence of a magnetic island has been shown to cause an upshift in the BAE gap frequency [1]. In the absence of an island the minimum of the continuum frequencies is located at the resonant rational surface; the island moves the location of the minimum to the island separatrix as a result of the coupling between helical mode numbers. The physical mechanism for this shift will be described employing analytical modeling. The shear Alfven spectrum is obtained globally through analytical methods, inside and outside the separatrix, for the first time. A WKB approximation is used in this analysis, and good agreement is found with previous numerical results.

[1] A. Biancalani, L. Chen, F. Pegoraro, and F. Zonca, Plasma Phys. Control. Fusion 53, 025009 (2011).

[1]Research supported by the U.S. DOE under grants DE-FG02-99ER54546 and DE-SC0006103.

Carson Cook
University of Wisconsin

Date submitted: 09 Jul 2014 Electronic form version 1.4