Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Tearing Mode Stability with Sheared Toroidal Flows[1] RYAN WHITE, BRUNO COPPI, Massachusetts Institute of Technology — Toroidal plasma flow induced by neutral beam heating has been found to increase the stability of tearing modes in tokamak plasmas. The need to extrapolate current (experimentally-based) knowledge of tearing mode onset to future machines, requiresa better understanding of the essential physics. We consider the physics of flow near the rational surfaces. For realistic flow profiles, the velocity shear near the rational surface can be treated as a perturbation, and is found to amplify the dominant stabilizing effect of magnetic curvature. This effect can be seen using a cylindrical model if large-aspect-ratio corrections to the magnetic curvature are incorporated. On the other hand, the physical effects of toroidal rotation are completely absent in a cylinder, and require a fully-toroidal calculation to study. The toroidal rotation near the rational surface is found to couple to a geometrical parameter which vanishes for up-down symmetric profiles. Physically, the dominant effects of rotation arise from a Coriolis force, leading to flow directional dependence.

[1]This work is supported by the US DOE.

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Date submitted: 13 Jul 2016 Electronic form version 1.4