The Stabilizing Effect of Flow Shear on $m/n=3/2$ Magnetic Island Width in DIII-D

R.J. LA HAYE, General Atomics, R.J. BUTTERY, Culham Science Centre — It is found that flow shear has a stabilizing effect on $m/n = 3/2$ neoclassical tearing mode (NTM) islands through a more negative classical tearing stability index $\Delta'$ in the DIII-D \cite{1} tokamak. The heating neutral beams are mixed between co- and counter-directions to vary the torque on the plasma and thus the plasma flow (rotation) and flow shear. This is done “shot to shot” in the presence of a “saturated” $m/n = 3/2$ NTM while slowly raising the plasma. A heuristic model for the stabilizing effect of flow shear on $\Delta'$ is shown to explain how flow shear acts to reduce NTM island size and obviate the effect of higher beta and concomitant destabilizing helically perturbed bootstrap current.

\cite{1} J.L. Luxon, Nucl. Fusion 42, 614 (2002).

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