

The stabilizing effect of flow shear on $m/n=3/2$ magnetic island width in DIII-D

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Abstract

It is found that flow shear has a stabilizing effect on $m/n = 3/2$ neoclassical tearing mode islands through a more negative classical tearing stability index Δ' in the DIII-D [J.L. Luxon, Nucl. Fusion **42**, 614 (2002)] 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 $m/n = 3/2$ neoclassical tearing mode while slowly raising the plasma beta up to the limit of the onset of an $m/n = 2/1$ mode. A heuristic model for the stabilizing effect of flow shear on Δ' 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.

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