Density driven rotation changes in DIII-D H-mode plasmas*

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Density driven rotation reversals have been observed in core plasmas on C-Mod as well as AUG in plasmas that rotate spontaneously [1,2]; this driving mechanism is usually referred to as the so-called intrinsic torque [3]. The existence of the intrinsic torque is linked to the natural occurring turbulence in the plasma and the observed rotation reversals have been attributed to changes in the underlying turbulence regime, which affect the direction of the intrinsic torque [3]. In this paper, we will show that H-mode plasmas in DIII-D that are in the so-called Ion Temperature Gradient (ITG) dominant regime, as well as plasmas that are in the Trapped Electron Mode (TEM) regime, observe a strong reduction in the core rotation such that the rotation gradient reverses when the density is increased at constant 0.2-0.4 N-m injected torque. The plasmas in the TEM regime are dominantly ECH heated and observe an initial flattening of the core rotation in comparison with plasmas that are dominantly NBI heated. However, once the density increases in the NBI heated plasma, as well as the ECH heated plasma, the core rotation drops. This reduction in the core rotation is not the result of the conservation of momentum due to the increase in density.

*This work was supported in part by the U.S. DOE under DE-SC0007880[1], DE-AC05-06OR23100[2], DE-AC02-09CH11466[3], DE-FG02-08ER54984[5], DE-FG02-06ER54871[6], and DE-FC02-04ER54698[7].

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