Abstract Submitted
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Advances in Understanding and Control of Plasma Rotation on DIII-D[1] B A GRIERSON, N LOGAN, S HASKEY, A ASHOURVAN, PPPL, D ERNST, MIT, C CHRYSTAL, J DEGRASSIE, GA, J BOEDO, UCSD, T TALA, A SALMI, VTT — Momentum transport experiments on DIII-D have advanced our understanding of the origin of core and edge rotation by showing that (1) core rotation in low-torque electron-heated ITER-like plasmas displays hollowing driven by turbulence in the absence of MHD, (2) intrinsic rotation in torque-free electron-heated plasmas follows the favorable rho* and nu* scalings as previously found in intrinsic torque experiments using NBI, (3) the edge plasma rotation can be controlled through shaping of triangularity and X-point radius, and (4) rotation and density profiles have separate dependencies on the applied 3D field spectra. These advances inform strategies to avoid low torque disruptions by tailoring turbulent modes that minimize rotation hollowing, and provide confidence in dimensionless scaling of intrinsic torque and rotation to ITER. The triangularity and X-point position provide important new actuators on the rotation beyond neutral beam injection that are available for any diverted tokamak including ITER. The separate spectral dependencies of the momentum and density explain how quiescent braking as well as edge isolated ELM control are possible even in machines with limited toroidal harmonic EFC coils.

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