Abstract Submitted
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Non-inductive Hybrid ScenarioTransport and Turbulence at Reduced Plasma Torque[1] K.E. THOME, ORAU, C.C. PETTY, D.C. PACE, GA, F. TURCO, Columbia U, T.L. RHODES, UCLA — As the neutral beam injection (NBI) torque is lowered in steady-state hybrid plasmas via counter-beam injection, increased turbulence and thermal transport is observed, particularly in the ion channel. These discharges require P_{co-NBI}= 11 MW and P_{ECH}= 3 MW to achieve zero surface loop voltage. As the beam torque is reduced from ∼8.5 N-m to ∼4 N-m with $\beta_N \sim 3$ and $q_{95} \sim 6$, the global confinement decreases from $H_{98y,2}$ of ∼ 1.5 to ∼ 1.2. Local transport analysis using TRANSP shows that the lower torque discharges have increased ion thermal diffusivity across the whole profile and increased electron thermal diffusivity localized to the ρ= 0.7 region. Similarly, Doppler Backscattering shows increased density fluctuations at intermediate wavenumbers at the lower torque. However, fast-ion transport caused by off-axis fishbones favorably decreases from $\sim 0.7m^2/s$ to $\sim 0.1m^2/s$ as the torque is lowered, partially offsetting the thermal transport reduction. These measured changes in turbulence and transport are being compared to plasma simulations using TGLF/GYRO to better predict the confinement of future steady-state hybrids that will be primarily RF-heated.

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