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[ ] Theory [X] Experiment

ITER Steady-State Demonstration on DIII-D,[*] J.M. Park, M. Murakami, A. Sontag, S.J. Diem, *ORNL*; C.T. Holcomb, *LLNL;* J.R. Ferron, T.C. Luce, *GA*; DIII-D Team – A systematic scan of q_{95} (=4.5, 5.5, 6.5) at constant β_N (~3) and high q_{min} (~1.8-2.1) has been obtained in a lower single null ITER-like shape to study confinement, stability and edge pedestal characteristics using off-axis neutral beam current drive for the ITER steady-state mission (f_{NI}=1, Q=5). The edge pedestal height is found substantially lower than in similar 2008 experiments, resulting in lower f_{NI} due to reduced edge pedestal bootstrap current. Toroidal Alfvén Eigenmode power fluctuation is well correlated with the estimated beam ion diffusion (D_b). Strong dependency of D_b on q_{95}, q_{min} and neutral beam power (PNB) has been found indicating that lower q_{95} (<=4.5) would have reasonably good beam ion confinement (D_b <= 0.3 m^2/s) even at q_{min}>2 and high PNB=12 MW. The calculated ideal β_N stability limit increases with lower q_{95} allowing access to high β_N (>3.5) needed for f_{NI}=1 and Q=5. This study shows that optimum choice of q_{95} (~5.5) and q_{min} (>2) is crucial to achieving Q=5 steady-state mission for ITER.

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