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Transport and Stability Characteristics of High q_{min} Steady-State Scenarios with Off-Axis NBI[1] J.M. PARK, Oak Ridge National Laboratory, J.R. FERRON, General Atomics, C.T. HOLCOMB, Lawrence Livermore National Laboratory, T.C. LUCE, R.J. BUTTERY, L.L. LAO, R. PRATER, General Atomics, F. TURCO, Columbia University, M. MURAKAMI, Oak Ridge National Laboratory — DIII-D experiments show that off-axis neutral beam injection (NBI) improves access to high β and fully noninductive current sustainment at elevated minimum q (q_{min}) by broadening the plasma current and pressure profiles. Off-axis NBI modifies the underlying characteristics of transport and stability, as expected from theory. For on-axis NBI, the electron (ion) confinement time normalized to ITER H-mode scaling, $\tau_{th,H_{98}}$ increases (decreases) with q_{min}. For off-axis NBI, both power balance analysis and TGLF modeling indicate better ion but worse electron confinement, when compared with on-axis NBI at the same q_{min}. There appears to be a strong confinement scaling with Shafranov shift, the ratio of electron to ion heating, and the location of heat deposition. The broader pressure profile obtained from off-axis NBI helps to avoid low-order tearing modes and increases the calculated ideal-wall β_N limit. Nonlinear optimization of confinement and stability to achieve higher β_N (>4) with fully noninductive current drive will be discussed using theory-based scenario modeling validated against high q_{min} discharges with on- and off-axis NBI.

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