Abstract Submitted
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Exploring an Alternate Approach to Q=10 in ITER[1] T.C. LUCE, General Atomics, F. TURCO, Columbia U. — The ITER Research Plan envisions a stepwise approach in B and I due to heating system constraints to the objective of 500 MW fusion power with Q=10 for >300 s, but always reaching $q_{95}=3$ at each B. An alternate approach goes directly to 5.3 T, then raises I. This approach reduces disruption risk because q is higher and perhaps the goal is realized at lower I. DIII-D experiments explored this path with co-NBI heating and NBI heating with 0 Nm applied torque. For the first time, stable plasmas in the ITER shape (including aspect ratio) at the ITER baseline scenario conditions ($q_{95}\approx 3$, $\beta_{\mathrm{N}}\approx 2$) have been obtained with 0 Nm applied torque. At equivalent currents to 9-17 MA in ITER ($q_{95}\approx 5.7$-2.8), the maximum stable β and the τ_{E} have been measured as a function of applied torque. The equivalent β for 500 MW of fusion power is obtained at about 13.5 MA for 0 Nm, indicating significant stability margin. However, confinement is less than predicted by the H-mode scaling at 15 MA because linear confinement scaling with I is not seen above 12.5 MA at all levels of applied torque, indicating this is not due to ExB shearing effects. These results indicate that the risk of operation in ITER at low q_{95} and specifically at 15 MA may not be warranted.

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