Abstract Submitted
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Heating and current drive requirements towards steady state operation in ITER[1] FRANCESCA POLI, CHARLES KESSEL, PPPL, PAUL BONOLI, MIT-PSFC, DONALD BATCHELOR, Retired, BOB HARVEY, COMPX — Steady state scenarios envisaged for ITER aim at optimizing the bootstrap current, while maintaining sufficient confinement and stability. Non-inductive scenarios will need to operate with Internal Transport Barriers (ITBs) to reach adequate fusion gain at typical currents of 9 MA. Scenarios are established as relaxed flattop states with time-dependent transport simulations with TSC. The $E \times B$ flow shear from toroidal plasma rotation is expected to be low in ITER, with a major role in the ITB dynamics being played by magnetic geometry. Combinations of external sources that maintain weakly reversed shear profiles and $\rho(q_{min}) \geq 0.5$ are the focus of this work. Simulations indicate that, with a trade-off of the EC equatorial and upper launcher, the formation and sustainment of ITBs could be demonstrated with the baseline configuration. However, with proper constraints from peeling-ballooning theory on the pedestal width and height, the fusion gain and the maximum non-inductive current (6.2MA) are below the target. Upgrades of the heating and current drive system, like the use of Lower Hybrid current drive, could overcome these limitations. With 30MW of coupled LH in the flattop and operating at the Greenwald density, plasmas can sustain $\sim$ 9MA and achieve $Q \sim 4$.

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