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# Assessment of Operational Space for Long-Pulse Scenarios in ITER

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Operational space (I_p-n) for long pulse scenarios (t_burn ˜ 1000 s, Q > 5) foreseen in ITER was assessed by 1.5D core transport modelling with pedestal parameters predicted by the EPED1 code. The analyses include the majority of transport models (CDBM, GLF23, Bohm/GyroBohm (BgB), MMM7.1, MMM95, Weiland, Scaling-Based) presently used for interpretation of experiments and ITER predictions. The EPED1 code was modified to take into account boundary conditions predicted by SOLPS for ITER. In contrast with standard EPED1 assumptions the EPED1 with the SOLPS boundary conditions predicts no degradation of the pedestal pressure with density reduction. Reducing the plasma density to n_e ˜ 5-6 10ˆ19mˆ-3 leads to an increased plasma temperature (similar pedestal pressure) which reduces the loop voltage and increases the duration of the burn phase to t_burn˜ 1000 s with Q > 5 for I_p > 13 MA at moderate normalised pressure, beta_N ˜ 2 in ITER. These ITER plasmas require the same level of additional heating power as the reference Q = 10 inductive scenario at 15 MA (33 MW NBI and 17 - 20 MW EC heating and current drive power). However, unlike the 'hybrid' scenarios considered previously, these H-mode plasmas do not require specially shaped q profiles nor improved confinement in the core for the transport models considered in this study. Thus, these medium density H-mode plasma scenarios with I_p > 13 MA present an attractive alternative to hybrid scenarios to achieve ITER's long pulse Q > 5 and deserve further analysis and experimental demonstration in present tokamaks.

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