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Assessment of Access to ITER Steady-State Operation using CORSICA S.H. KIM, A.R. POLEVOI, A. LOARTE, ITER Organization, S. YU. MEDVEDEV, Keldysh Institute of Applied Mathematics and Kurchatov Institute, G.T.A. HUIJSMANS, CEA — An assessment of ITER steady-state plasma operation using 0-D operational space scans and ASTRA/KINX ideal MHD stability analysis has shown that Q˜5 fully non-inductive operation can be achieved by using only the ITER NBI and EC systems in the range of foreseen upgrades [A.R. Polevoi, et al., 46th EPS Conference, 8-12.07.2019, ECA Vol. 43C, P5.101]. This analysis revealed that operating the plasma at 9-10MA and 60-80% Greenwald density would be necessary to achieve a sufficient current-drive efficiency that maintains the required fusion power gain. However, an optimization of NBI and off-axis ECCD will be essential to find a target plasma state that avoids core MHD instabilities by tailoring the current profile and relaxing the requirement on the energy confinement enhancement. An upgrade of NBI power up to 49.5MW by adding a 3rd beam line and the use off-axis ECCD with a power level of 20-30MW from the equatorial and upper launchers are foreseen. In the present study, access to fully non-inductive Q˜5 ITER steady-state operation with NBI and EC heating and current drive has been modelled to demonstrate the Q˜5 steady-state goal with the NBI and EC power upgrade options and within CS/PF coil limits, provided that the desired energy confinement (H98=1.5-1.6) can be reached. Integrated scenario simulations using CORSICA show that ITER would be able to develop a strategy for profile tailing during the current ramp and accessing the target steady-state plasma.

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