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Analysis and Simulation of ITER Steady-State Discharges on DIII-D[1] S.J. DIEM, M. MURAKAMI, J.M. PARK, A.C. SONTAG, Oak Ridge National Laboratory — One of the primary goals of the ITER project is to demonstrate a reactor scale steady-state operation for future tokamaks. This is a challenging task which requires simultaneous operation with fully noninductive current drive, a fusion gain of $Q \geq 5$ and IBS for discharges approximately 3000s in length. Previously, DIII-D has demonstrated fully noninductive scenario in ITER-like shaped plasmas at relatively high $q_{95} \sim 6.5$ and moderate $\beta_N \sim 3$ but with low fusion performance ($G = \beta_N H_{89}/q_{95}^2 \sim 0.15$). Recent high q_{min} experiment and modeling indicate that the goal of $G = 0.3$ predicted for $Q = 5$ operation on ITER can be achieved noninductively at reduced q_{95} and at higher β_N. An optimum choice of q_{95} and β_N for the ITER steady-state mission will be discussed based on the experimental scaling from ITER demonstration discharges on DIII-D, as well as predictive FASTRAN scenario modeling using TGLF coupled to the Integrated Plasma Simulator. FASTRAN is a new iterative numerical procedure that integrates a variety of models (transport, heating, CD, equilibrium and stability) and has been shown to reproduce most features of DIII-D high beta discharges with a stationary current profile.

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