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Understanding and Predicting the Dynamics of Tokamak Discharges during Startup,* G.L. Jackson, D.A. Humphreys, A.W. Hyatt, J.A. Leuer, T.C. Luce, P.A. Politzer, *General Atomics*; J.H. Yu, *UCSD;* T.A. Casper, *LLNL;* R.V. Budny, *PPPL* — Understanding the dynamics of plasma startup is important for present tokamaks and for predictive modeling of burning plasma devices, e.g. ITER. We report on experiments in DIII-D to explore plasma startup and benchmarking of transport models. Key issues have been examined such as plasma startup with limited inductive electric field, E_ϕ and achieving flattop within the technical limits of coil systems and their actuators. In the DIII-D tokamak, scaled ITER-like discharges were initiated with E_ϕ typical of ITER (0.3 V/m) and 2nd harmonic electron cyclotron assist. A fast framing camera was used to study formation physics. Plasma current evolution using neoclassical conductivity calculated in the Corsica code from experimental profile measurements agrees with rampup experiments, but prediction of the temperature and internal inductance evolution is not yet accurate enough to allow extrapolation to future devices.

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