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Integrated Scenario Modeling for Steady State and Hybrid Scenario in DIII-D and ITER[1] J.M. PARK, NFRC, M. MURAKAMI, ORNL, H.E. ST. JOHN, General Atomics, DIII-D TEAM — Integrated scenario modeling and simulation are carried out for steady-state Advanced Tokamak (AT) and hybrid discharges in DIII-D, and then applied to ITER using the parallelized ONETWO/GLF23 code with particle transport and fast ion diffusion. Time-dependent simulations with GLF23 model for thermal particle transport reveal the complex interactions with the energy transport leading to the strong influence on the current profile evolution in DIII-D AT discharges. Modeling of current profile with ad-hoc assumed fast ion diffusion successfully reproduces the experimentally measured broad current profile with $q_0 > 1$ in a stationary phase of DIII-D hybrid discharges. The integrated modeling tools validated against DIII-D experiments are applied to ITER, indicating existence of fully noninductive operations at $Q \sim 5$ with Day-1 hardware capabilities. Simulations also suggest that high fusion performance with an extended burning duration at $Q \sim 10$ can be achieved with fully penetrated current profile and $q_0 > 1$ for an ITER hybrid scenario.

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J.M. Park
NFRC

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