Abstract Submitted for the Forty-Eighth Annual Meeting
Division of Plasma Physics
October 30th-November 3, 2006, Philadelphia, Pennsylvania

Category Number and Subject: 5.6.2. DIII-D Tokamak

[ ] Theory [X] Experiment

Integrated Scenario Modeling for Steady State and Hybrid Scenario in DIII-D and ITER,* J.M. Park, *NFRC/ORNL*, M. Murakami, *ORNL,* H.E. St. John, *General Atomics,* the 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~5 with Day-1 hardware capabilities. Simulations also suggest that high fusion performance with an extended burning duration at Q~10 can be achieved with fully penetrated current profile and $q_0>1$ for an ITER hybrid scenario.

*Work supported in part by US DOE under DE-AC05-00OR22725 and DE-FC02-04ER54698.