New Plasma Discharge Development Tools for the DIII-D Plasma Control System[1] A.S. WELANDER, N.W. EIDIETIS, D.A. HUMPHREYS, A.W. HYATT, J.A. LEUER, M.L. WALKER, General Atomics — A new set of discharge design tools has been implemented under the GA Tokamak System Toolbox (TokSys) [1]. A new equilibrium design tool enables development of target equilibria, and upgraded simulation tools enhance testing of new control algorithms for devices that share the DIII-D Plasma Control System (including DIII-D, NSTX, EAST, KSTAR and others). Such tools will be needed for high power devices such as ITER, which require extensive commissioning of discharges to minimize disruptions and maximize the scientific return. Control verification by simulation will enable ITER to focus on exploring the unknown while minimizing risks from the known. The *DIII-D simulation simserver* is a comprehensive simulation of the tokamak including power supplies, conductors, plasma, diagnostics, and actuators, which can be connected to the actual control system. It has been used extensively to test implementations and study multi-algorithm integrated control performance in DIII-D and other devices.

[1] D.A. Humphreys, et al., Nucl. Fusion **47** (2007) 943.

Anders Welander
General Atomics

Date submitted: 15 Jul 2011

Electronic form version 1.4