

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

Category Number and Subject:

Theory Experiment

Steady-State, High-Performance Operation of DIII-D,* P.A. Politzer, *General Atomics* for the DIII-D AT Thrust – The DIII-D AT program objective is to develop and demonstrate a steady-state scenario with performance that extrapolates to $Q>5$ in ITER. This year, we examine two aspects of AT optimization. Using the newly improved pumping, we have established a double-null, high triangularity AT reference plasma. Further optimizing this shape by varying squareness (ζ) has shown that confinement appears to improve with reduced ζ and that there is an optimum ζ for MHD stability. Changes in pedestal and ELM conditions with varying ζ are being analyzed. We are also undertaking experiments to optimize the q profile for AT operation. As the tools needed for maintaining a stationary high performance q profile are not yet available, we concentrate on optimization under slowly varying transient conditions, using varying combinations of co-and counter-injection as well as B_T ramping to modify the current profile. The variables are q_{\min} (>2), $q_0 - q_{\min}$ (range 0-1), and $\rho_{q_{\min}}$ (>0.5). Issues being addressed are the nature of the limiting instabilities ($n=2$ and 3 are predicted to dominate), the dependences of the β limit and of f_{NI} on q_{\min} and rotation.

*Supported by the US DOE under DE-FC02-04ER54698.