Abstract Submitted
for the DPP02 Meeting of
The American Physical Society

Sorting Category: 5.6.2 (Experimental)

Comparison of Measured and Calculated β Limits in DIII-D Steady-State Scenario Discharges[1] J.R. FERRON, C.M. GREENFIELD, T.C. LUCE, P.A. POLITZER, A.D. TURNBULL, General Atomics, A.M. GAROFALO, Columbia U., M. MURAKAMI, M.R. WADE, ORNL — In an advanced tokamak discharge a large fraction of the total current should come from bootstrap current ($f_{\rm BS}$), which increases with both the normalized beta ($\beta_{\rm N}$) and the minimum value of the safety factor ($q_{\rm min}$). In recent discharges with $q_{\rm min}$ near 2.5, the achievable $\beta_{\rm N}$ was approximately 2.8, reduced compared to $\beta_{\rm N} \approx 4$ obtained with $q_{\rm min}$ near 1.5. The trend of decreasing $\beta_{\rm N}$ with increasing $q_{\rm min}$ is in agreement with the predicted (for $n = 1$) and measured ideal no-wall $\beta_{\rm N}$ limit. The measurement is made by turning off the external field symmetrization current and observing the $n = 1$ resistive wall mode (RWM) that grows when beta is above the no-wall limit. Similar measurements were made to test the dependence of the no-wall beta limit on up/down symmetry of the double-null divertor shape and on toroidal field (or q_{95}). Also reported are modeling studies of high $f_{\rm BS}$ equilibria, with pressure profiles broader than in typical present experiments, that have $\beta_{\rm N}$ limits above those observed in the experiment.

[1]Work supported by US DOE Contracts DE-AC03-99ER54463, DE-FG02-89ER53297, and DE-AC05-00OR22725.

J.R. Ferron
ferron@fusion.gat.com
General Atomics

[X] Prefer Oral Session
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Date submitted: July 19, 2002 Electronic form version 1.4