Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

The Saturation of Beta in W7-AS[1] M.C. ZARNSTORFF, E. FREDRICKSON, D. MONTICELLO, A. REIMAN, PPPL, Princeton, NJ, A. WELLER, J.P. KNAUER, MP-IPP, Euratom Assoc., Greifswald Germany, W7-AS TEAM — Quasi-stationary, MHD-quiescent discharges with $\langle\beta\rangle$ up to 3.5% were sustained in the W7-AS for more than 100 energy confinement times.. The achieved $\langle\beta\rangle$ is limited by confinement, not stability, and is above the linear ideal stability threshold. Neutral beam heating power scans are analyzed for vacuum iota values of 0.445 and 0.575. The scans saturate at $\langle\beta\rangle$ values of 3.1% and 2.1%, respectively. At low power, both scans show confinement incrementally varying as $\tau_E \propto P_{NB}^{-0.5}$. At high P_{NB}, the confinement incrementally varies as $\tau_E \sim P_{NB}^{-0.8}$. In both scans, only the central T_e responds to increasing power. T_e and ∇T_e do not change appreciably in the outer region of the plasma as P_{NB} increases, indicating an increase in local thermal diffusivity. The edge∇T_e is approximately a factor of two larger for lower iota. The role of the magnetic flux topology has been analyzed using the PIES 3D equilibrium code. It calculates that a stochastic field region forms at the edge with increasing $\langle\beta\rangle$, and that it reduces the minor radius by ∼30% at the saturated $\langle\beta\rangle$ value. In the higher iota scan, this occurs at lower $\langle\beta\rangle$ and the stochastic region has a shorter connection length, plausibly explaining the reduced ∇T_e, and lower saturated$\langle\beta\rangle$.

[1]Supported in part by U.S. DoE Contract DEAC0276CHO3073.

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Date submitted: 27 Jul 2005 Electronic form version 1.4