Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Overview of HSX Results and Future Directions[1] D.T. ANDERSON, University of Wisconsin-Madison, FOR THE HSX TEAM — HSX is a quasi-helically symmetric (QHS) stellarator with minimal toroidal curvature and high effective transform. We present recent results at 1 Tesla operation which highlight the unique features of the bootstrap and Pfirsch-Schlueter currents. Large parallel flows, usually neglected in stellarator calculations, have been observed by CXRS in qualitative agreement with results first predicted by the PENTA code [1]. Electron temperatures in the core during ECRH are up to 2.5 keV with 100 kW input power and drop to 1.5 keV when the symmetry is intentionally degraded. The steep temperature gradient in the core is indicative of a core electron root confinement (CERC) mode. PENTA calculations support the conclusion that even with small symmetry-breaking, it is possible to achieve a neoclassical ITB based on the proximity of an electron root near an ion root. A Weiland ITG/TEM tokamak model for anomalous transport supports the conclusion that E x B suppression of turbulence is responsible for the improved confinement in the plasma core. At a lower field of 0.5 Tesla, an instability due to fast electrons is observed, which disappears when the symmetry is broken. Experimental measurements indicate that the mode is acoustic. We will also briefly summarize topics of current research and future plans.

[1]Supported by USDOE under Grant DE-FG02-93ER54222

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Date submitted: 21 Jul 2009 Electronic form version 1.4