

Abstract Submitted  
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**Measurement of the Pfirsch-Schlüter and Bootstrap Currents in HSX** J.C. SCHMITT, J.N. TALMADGE, D.T. ANDERSON, P.H. PROBERT, HSX Plasma Laboratory, University of Wisconsin-Madison — Pfirsch-Schlüter (PS) and bootstrap currents in the quasihelically symmetric stellarator HSX are unlike those of a conventional stellarator. The lack of toroidal curvature in HSX results in a helical PS current that rotates with toroidal angle. The PS current is smaller in size than for comparable MFEs by a factor of  $n-m\iota$  ( $=3$  in HSX). The bootstrap current in HSX is opposite in direction to that in a tokamak, which reduces the rotational transform but increases the effective transform. An external Rogowski and magnetic pickup coil array measure the currents. The bootstrap current rises throughout the discharge on a 10-50 ms timescale, approaching a maximum value between 0.4-0.5 kA. The PS current rises on a 5-10 ms timescale and exhibits a dipole variation.  $T_e$  and  $n_e$  profiles are measured with a 10-chord Thomson scattering system, showing central  $T_e$  ( $n_e$ ) up to 1.6 keV ( $5 \times 10^{12} \text{ cm}^{-3}$ ). Varying the electron pressure profile and gradients adjusts the equilibration times and maximum values. HSX can spoil the symmetry with a set of auxiliary coils which adds a  $(n, m) = (4, 0)$  symmetry-breaking term in the  $|\mathbf{B}|$  spectrum. This degrades the neoclassical properties of HSX and affects the resulting equilibrium currents. The measured currents will be compared to theoretical estimates. Supported by DOE grant number DE-FG02-93ER54222.

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