Abstract Submitted
for the APR06 Meeting of
The American Physical Society

Bootstrap current in optimized stellarators[1] A.S. WARE, University of Montana, D.A. SPONG, L.A. BERRY, S.P. HIRSHMAN, J.F. LYON, Oak Ridge National Laboratory — This work examines bootstrap current and its impact on the equilibrium properties in optimized stellarators. Two independent methods are used to calculate the bootstrap current: a fast code based on a calculation in an asymptotically collisionless limit [K. C. Shaing, *et al.*, Phys. Fluids B **1**, 148 (1989)] and a fluid moments approach that self- consistently calculates the neoclassical transport coefficients, including the bootstrap current [D. A. Spong, Phys. Plasmas **12**, 056114 (2005)]. The bootstrap current calculations from the two codes were done for low density, ECH-heated and high density, ICH-heated plasmas. In the configurations examined here, namely, the Quasi-Poloidal Stellarator (QPS), the National Compact Stellarator Experiment, the Helically Symmetric Experiment (HSX), the Large Helical Device, and the Wendelstein- 7X Stellarator (W7-X), the bootstrap currents predicted from the two codes agree qualitatively for both ICH and ECH profiles. A self-consistent bootstrap current results in a negligible increase in the rotational transfrom for W7-X, an increase in the rotational transform for QPS, and a larger decrease in the rotational transform for HSX.

[1]Work supported by U.S. Department of Energy under Grant DE-FG02-03ER54699 at the University of Montana and Contract DE-AC05-00OR22725 at ORNL with UT-Battelle, LLC.

Andrew Ware
University of Montana

Date submitted: 13 Jan 2006 Electronic form version 1.4