Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Neoclassical and anomalous flows in stellarators[1] A.S. WARE, T. MARINE, University of Montana, D.A. SPONG, Oak Ridge National Laboratory — The impact of magnetic geometry and plasma profiles on flows and viscosities in stellarators is investigated. This work examines both neoclassical and anomalous flows for a number of configurations including a particular focus on the Helically Symmetric Experiment (HSX) and other quasi-symmetric configurations. Neoclassical flows and viscosities are calculated using the PENTA code [1]. For anomalous flows, the neoclassical viscosities from PENTA are used in a transport code that includes Reynolds stress flow generation [2]. This is done for the standard quasi-helically symmetric configuration of HSX, a symmetry-breaking mirror configuration and a hill configuration. The impact of these changes in the magnetic geometry on neoclassical viscosities and flows in HSX are discussed. Due to variations in neoclassical viscosities, HSX can have strong neoclassical flows in the core region. In turn, these neoclassical flows can provide a seed for anomalous flow generation. These effects are shown to vary as the ratio of electron to ion temperature varies. In particular, as the ion temperature increases relative to the electron flow shear is shown to increase.
[1] D. A. Spong, Phys. Plasmas 12, 056114 (2005).
[2] D. E. Newman, et al., Phys. Plasmas 5, 938 (1998).

[1]Work supported by U.S. DOE under Grant DE-FG02-03ER54699.

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Date submitted: 21 Jul 2009 Electronic form version 1.4