Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Shear flow generation in stellarators - configurational variations[1]

D.A. SPONG, J.H. HARRIS, S.P. HIRSHMAN, L.A. BERRY, Oak Ridge National Lab., A. WARE, University of Montana-Missoula — Plasma momentum transport within magnetic surfaces is important for a number of toroidal plasma physics issues, such as: turbulence suppression, impurity transport, and bootstrap current generation. Stellarators provide new opportunities for understanding of plasma flow effects because (a) new forms of quasi-symmetry (e.g., helical, poloidal) can be produced that differ significantly from the tokamak; and (b) symmetry breaking effects remove the degeneracy between parallel and cross-field transport characteristic of symmetric systems. A method has been developed to evaluate neoclassical self-generated plasma flows in stellarators; this indicates that flow directionality and shearing rates are significantly influenced by the magnetic structure. The possibility that such effects could be a new hidden variable in the stellarator confinement database is an important focus for our model. For example, a recent analysis of a series of inwardly shifted LHD discharges has indicated that decreases of up to a factor of 10 in the neoclassical viscosity (allowing greater flow shearing) were correlated with the experimentally observed improved confinement times.

[1]Research sponsored by the U.S. Department of Energy under Contract DE-AC05-00OR22725 with UT-Battelle, LLC

Donald Spong
Oak Ridge National Lab.

Date submitted: 21 Jul 2006 Electronic form version 1.4