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Measurement of Flows in the HSX Stellarator Demonstrating the Importance of Momentum-Conservation in Neoclassical Flow Modeling<sup>1</sup> A. BRIESEMEISTER, HSX Plasma Laboratory, University of Wisconsin, Madison, USA, J. LORE, ORNL, K. ZHAI, D.T. ANDERSON, F.S.B. ANDERSON, J.N. TALMADGE, HSX Plasma Laboratory, University of Wisconsin, Madison, USA — The flow velocity of carbon ions is measured using a Charge Exchange Recombination Spectroscopy (CHERS) system on the Helically Symmetric Experiment (HSX), a quasi-helically symmetric stellarator. Intrinsic parallel flow speeds of up to 20km/s have been measured. The parallel velocity is compared to the predictions of the PENTA code [1-2]. Multiple ion species, including the species used for the CHERS measurements, are included in the calculations. PENTA is a neoclassical code that includes the effects of momentum-conservation, which are often neglected for nonsymmetric stellarators. Without momentum conservation the parallel flow velocity in HSX is under-predicted by approximately an order of magnitude. Agreement is seen between the measured and calculated parallel flows when momentum conservation is included.

D.A. Spong, Phys. Plasmas 12 (2005) 056114.
J. Lore et al, Phys. Plasmas 17 (2010) 056101.

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