Abstract Submitted
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Targeted Physics Optimization in the HSX Stellarator[1] J.N. TALMADGE, K.M. LIKIN, HSX Plasma Lab, University of Wisconsin, Madison, V.V. NEMOV, Institute of Plasma Physics, Kharkov, Ukraine, Y. TURKIN, Max-Planck Institut für Plasmaphysik, Greifswald, Germany, W. KERNBICHLER, Institut für Theoretische Physik, Graz, Austria — The quasihelically symmetric (QHS) stellarator HSX has a set of auxiliary magnet coils that were used in previous experiments to show that particle and heat transport, as well as plasma flow damping, is smaller in the QHS configuration compared to results obtained when the symmetry is degraded. To plan out future experiments, we have developed an optimization code to vary the currents in the auxiliary coils and to minimize or maximize several target physics functions. There are 48 such auxiliary coils in HSX, 12 per field period, but we vary only the currents in 6 of them and mirror those currents to maintain stellarator symmetry. We are particularly interested in minimizing and maximizing a parameter related to the bounce-averaged grad-B drift velocity of trapped particles such as alpha particles in a fusion reactor [1]. The intent is to investigate how the magnetic configuration affects energetic particle confinement in HSX when heated with ICRF. Other target parameters that are being explored are the effective ripple, the geometric bootstrap current coefficient and the damping rate of the plasma flow.

[1] V.V. Nemov et al., Physics of Plasmas 12, (2005) 112507.

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