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Targeted Physics Optimization in the HSX Stellarator[1] J.N. TALMADGE, HSX Plasma Laboratory, H.E. MYNICK, Princeton Plasma Physics Laboratory, V.V. NEMOV, Institute of Plasma Physics, Kharkov, Ukraine — To plan out future experiments in HSX, we have developed a code to vary the currents in the auxiliary coils and optimize specific target physics functions. One such function is related to the bounce-averaged grad-B drift velocity of trapped particles such as alphas in a fusion reactor. For HSX, decreasing energetic trapped particle losses by increasing the number of main coils (which decreases the modular ripple) leads to an increase in the effective ripple. Thus, minimizing effective ripple by itself is not a sufficient figure of merit for energetic particle confinement. Of particular interest for optimization is the exploration of configurations in HSX which can lower turbulent transport. Recent optimization studies by Mynick using proxy functions, and subsequent nonlinear GENE calculations, indicate that the level of turbulent transport in HSX is sensitive to the excursion of the magnetic axis. Applying the simple criterion of reducing the axis excursion in HSX with the auxiliary coils shows that a configuration can be achieved in which the calculated saturated turbulent heat flux is reduced by a factor of 2 from the standard QHS configuration for a given temperature gradient scale length. Initial experimental results will be presented.

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