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A MSE Polarimetry diagnostic for the measurement of radial electric fields on the HSX stellarator T.J. DOBBINS, S.T.A. KUMAR, F.S.B. ANDERSON, D.T. ANDERSON, UW-Madison — The radial electric field in HSX has been measured using Charge Exchange Recombination Spectroscopy. These impurity ion flow measurements could not resolve a large positive radial electric field ($\sim 40\text{-}50$ kV/m) near the core of the HSX plasma, predicted by neoclassical codes. A dual PEM (Photo Elastic Modulator) MSE polarimetry system has been designed for direct measurement of the radial electric field in the HSX plasma. The polarimetry design has been optimized to get a maximum change in polarization angle from an electric field while still providing good spatial resolution. It is expected that a radial electric field as small as 2 kV/m can be detected. A synthetic diagnostic is added to the optimization model to see the effect of spot size and beam width on the measurement of electric field. In addition, work is being done to use the optical system for a BES system on HSX. Design and implementation of the BES system is in progress. Both diagnostic designs and initial calibrations are presented. This work is supported by US DOE grant DE-FG02-93ER54222.

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