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3-D Plasma Equilibrium Reconstruction at the HSX Stellarator[1]

E. CHLECHOWITZ, F.S.B. ANDERSON, D.T. ANDERSON, University of Wisconsin — A new diagnostic array of 80 magnetic coils has been built and installed inside the vacuum vessel to improve the performance of plasma equilibrium reconstructions at HSX. The location and orientation of the coils were optimized with respect to the effectiveness of the signal to reconstruct specific parameters which describe the plasma current and pressure profiles [1,2]. The use of subsets of the diagnostic array in the reconstruction process, which is performed by the V3FIT code [1], allows one to benchmark the theories used to calculate the effectiveness of each coil and their contribution to the overall reconstruction performance. In addition to the newly installed array, a Thomson Scattering diagnostic and further magnetic diagnostics have been used to put further constraints on the reconstruction and to validate the results, if the new array had been solely used. Different magnetic configurations have been investigated for these studies at HSX.

[1] J.D. Hanson et al, Nucl. Fusion 49 075031 (2009)
[2] N. Pomphrey et al, Phys. Plasmas 14, 056103 (2007)

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