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Overview of the Present HSX Program and Plans for HSX/U[1]

DAVID ANDERSON, HSX Plasma Laboratory, University of Wisconsin-Madison, THE HSX TEAM — Heat pulse propagation experiments yield electron thermal diffusivities comparable to those obtained from power balance, showing that HSX electron transport is not stiff. Nonlinear gyrokinetic calculations using GENE are used to calculate the saturated heat flux under experimental conditions. A new 80-coil internal magnetic diagnostic array is used for equilibrium reconstruction using the V3FIT code including the effect of eddy currents as modeled with the SPARK code. CXRS measurements of Pfirsh-Schlüter ion flows give inferred radial electric fields larger than previous estimates, but still smaller than neoclassically predicted values. New MSE systems to directly measure and model the radial electric field are under implementation. Measurements of the edge properties and structure in HSX are compared to models from EMC3-EIRENE. A proposed major upgrade is under consideration for HSX to modify the vacuum vessel and to use neutral beam injection to increase the ion temperature. This would allow access to low ion collisionality and ion-root discharges. Higher density operation provides for increased divertor parameters, impurity transport studies, and operational flexibility. A particular emphasis of the upgrade would allow for flexible divertor configurations as part of an expanded domestic initiative to improve the stellarator concept for extrapolation to a reactor.

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David Anderson
HSX Plasma Laboratory, University of Wisconsin-Madison

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