Abstract Submitted
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Infrared Constrained Equilibrium Reconstruction and Application to Snowflake Divertor Studies[1] J.T. WAI, P.J. VAIL, A.O. NELSON, Princeton University, Z.A. XING, Princeton Plasma Physics Laboratory, C. LASNIER, Lawrence Livermore National Laboratory, T.K. GRAY, Oak Ridge National Laboratory, E. KOLEMEN, Princeton University, DIII-D TEAM, NSTX-U TEAM — One of the challenges of the snowflake divertor (SFD) is a reliable means of reconstructing the magnetic field geometry in the divertor, due to the shallow flux gradients associated with multiple field nulls. We have developed a technique to improve SFD reconstruction using heat flux measured by the divertor InfraRed (IR)TV diagnostic. This technique identifies the spatial position of the two SFD X-points using characteristics of the heat flux, such as power distribution among the peaks and the fitted strike point positions. The algorithm to find X-points converges quickly and is amenable to real-time control. Using this method, a set of inferred X-point positions are used as a constraint to create new equilibria. Self-consistency is verified by using an analytic SFD heat flux model [1] to show that the X-point-constrained equilibria do indeed match the measured heat flux. The set of X-point-constrained equilibria are compared to kinetic equilibria, and we discuss differences in the pedestal and scrape-off layer. In particular, preliminary analysis shows that X-point-constrained equilibria predict 10% variation in the edge current levels versus kinetic equilibria without X-point constraints. [1] Vail, NME. 516-523 (2019) 9

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