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Using IDA to Understand Electron Temperature Structures in High Temperature Discharges in the Madison Symmetric Torus[1] L.M. REUSCH, M.E. GALANTE, D.J. DEN HARTOG, Univ of Wisconsin, Madison, P. FRANZ, Consorzio RFX, EURATOM-ENEA Association, Italy, J.R. JOHNSON, M.B. MCGARRY, H.D. STEPHENS[2], Univ of Wisconsin, Madison — The Madison Symmetric Torus (MST) Reversed-Field Pinch is equipped with two independent electron temperature (Te) diagnostics: Thomson scattering (TS) and double-filter soft x-ray (SXR). Both diagnostics are able to measure Te at a rate up to 25 kHz and are in good qualitative agreement in the hot plasma core, where Te $>$ 1 keV. We are able to combine information from both TS and SXR diagnostics along with prior physics knowledge using integrated data analysis techniques (IDA) [R. Fischer and A. Dinklage, Rev. Sci. Instrum. 75, 4237 (2004)] to improve the precision and utility of Te measurements on MST. Using IDA, there is a factor of 4 improvement in the uncertainty of all temperature measurements. We have also implemented a Markov Chain Monte Carlo analysis for analyzing the various temperature structures that MST is capable of sustaining. We have compared emissivity maps and flux surface reconstructions to the electron temperatures from several discharges to characterize the phenomenology of temperature structures in high temperature plasmas in MST.

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