Multi-Energy Soft X-ray Measurements of the Electron Temperature Profile[1] K. TRITZ, D.J. CLAYTON, D. STUTMAN, Johns Hopkins University, R.E. BELL, A. DIALLO, B.P. LEBLANC, M. PODESTA, Princeton Plasma Physics Laboratory, S. SABBAGH, Columbia University, NSTX TEAM — A novel analysis method using a neural network algorithm has been used to reconstruct the electron temperature profile for high power NSTX discharges with fast time resolution (> 10kHz) using multi-energy soft X-ray (ME-SXR) arrays both alone and in combination with low time-resolution space-resolved spectroscopy and a single chord of line-integrated density. This fast profile reconstruction uses the measured electron temperature profile from the 60Hz multipoint Thomson scattering (MPTS) diagnostic to train the neural network with the high time resolution ME-SXR data. Comparisons using cross-validation between the neural network reconstruction and the measured T_e profiles from MPTS show agreement within 5% over the profile radius. The accuracy of the neural network reconstruction demonstrates the ability to use ME-SXR diagnostics for high time resolution electron temperature measurements, and will be available on both EAST and NSTX-U for studies of electron heat transport as well as other general studies including impurity/particle transport, ELM profile dynamics, and MHD.

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