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The ME-SXR fast electron temperature diagnostic for NSTX[1] K. TRITZ, D. CLAYTON, M. FINKENTHAL, D. KUMAR, D. STUTMAN, Johns Hopkins University — A novel, compact multi-energy soft X-ray (ME-SXR) diagnostic has been designed, built, and installed on the National Spherical Tokamak eXperiment (NSTX). The system is comprised of 5 photodiode arrays viewing the plasma tangentially on the mid-plane through independent, vertically-stacked pinholes covered with different filters. By viewing the same plasma volume through filters with various transmission profiles, the ME-SXR diagnostic provides a coarse sub-sampling of the X-ray spectrum. This method allows the determination of fast changes in electron temperature, density, and impurity content by comparing the emission collected by the set of filtered diode arrays. The ME-SXR system views the plasma from $0.6 < r/a < 1.1$ with $\sim$1cm spatial resolution and >10kHz time resolution, and provides profiles of the changes in T_e, n_e, n_z relevant for studies of transport, low-f MHD instabilities, and ELM dynamics. With a careful selection of filters, the measurements are insensitive to uncertainties in the plasma composition, while remaining sensitive to changes in the T_e, n_e, and impurity profiles. Results of algorithm development for modeling profile changes will be presented.

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