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Sensor Multivariate Analysis for measuring X-ray radiation drive using the DANTE Diagnostic towards Inertial Confinement Fusion experiments[1] C.D. HARRIS, NNSA, G.E. KEMP, M.B. SCHNEIDER, K. WIDMANN, LLNL, M.S. RUBERY, AWE, M.J. MAY, LLNL — DANTE is a diagnostic used to measure x-radiation drive from hohlraums initiated by laser produced plasmas. It records the spectrally and temporally resolved radiation flux from various targets e.g., hohlraums, etc. at x-ray energies between 50 eV and 20 keV. Each sensor configuration on DANTE is composed of filters, mirrors and x-ray diodes to define 18 different x-ray channels whose output is voltage as a function of time. The absolute flux is then determined from the photometric calibration of the sensor configuration and a spectral reconstructing algorithm. The reconstruction of the spectra vs time from the measured voltages and known response of each channel has presented challenges. We demonstrate a novel approach here for quantifying the uncertainties on the determined flux and therefore, radiation temperature using A Partial Least Squares Regression (PLSR) calibration model. This technique uses the variances in both the spectral reconstruction and the error associated with the absolute calibration of each channel. Individual source spectra are created using an unfold algorithm where one channel response as a leave-out-one (LOO) model validation is performed on a test source spectrum and the radiation temperature and fluxes are predicted.

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