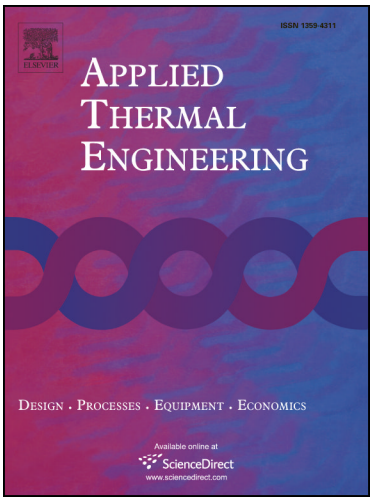


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# Chiller sensor fault detection based on empirical mode decomposition threshold denoising and principal component analysis

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## Abstract

This paper presented a chiller sensor fault detection method based on Empirical Mode Decomposition (EMD) threshold denoising and Principal Component Analysis (EMD-TD-PCA). EMD-TD-PCA was developed to remove noise in the original data set so as to improve fault detection efficiency for temperature sensor bias faults. First, EMD was used to enhance the data quality by removing the noise contained in the raw data set. A threshold denoising way was employed since it only eliminated noise but maintained the useful information. Second, the data processed with EMD threshold denoising were used to build the PCA model. The Q-statistic was adopted to detect the sensor faults. The proposed method was compared with the traditional PCA method. The operational data of a screw chiller system in an electric factory were used to evaluate this method. Results show that the EMD-TD-PCA method can effectively improve the fault detection efficiency especially for temperature sensor faults with introduced biases ranging from -2°C to +2°C at the 0.5°C interval, and also there will be certain differences in fault