

Feature Extraction of Gas Sensor Response Based on Subspace-Based Identification

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In this paper, feature extraction based on a subspace-based identification technique for a transient response of a semiconductor-type gas sensor is proposed. A typical gas sensor response can be interpreted as the sum of step responses of the first- or high-order lag system, and we have investigated the feature extraction method of the sensor output, which can be approximated by Prony's method. The method gives the time constant and gain parameters of the sensor response, which includes useful information for a discrimination of sample gases. In this paper, we show a feature extraction method based on a subspace-based identification for the step response of the sensor. The sum of exponentials model in Prony's method can be represented as a state space model. Then, the system matrices can be estimated by the multi-input multi-output (MIMO) output error state space model identification (MOESP)-like procedure. Numerical simulation shows that the proposed algorithm can be effective in feature extraction, and the method can be applied to the sensor response to mixture gases.

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