

Sensor Fault Detection and Identification of Indoor Air Quality in a Subway Station Based on Kernel PCA

Liu Hongbin, 유창규*, 임정진, 김민정, 오테석, 강온유,
김정태
경희대학교
(ckyo@khu.ac.kr*)

The conventional principal component analysis (PCA) may not function well for nonlinear processes, since the PCA-based monitoring scheme is based on the assumption that the process is linear. In this paper, a sensor fault detection and identification procedure based on kernel PCA is proposed to monitor the IAQ monitoring system. For the purpose of detecting the sensor fault, two statistics named Hotelling's T^2 and squared prediction error (SPE) are calculated in the feature space. Although much work has been reported that kernel PCA has a better performance for sensor fault detection, only a few methods are available for fault identification. The reconstruction-based contribution approach is used to identify locations of faulty sensors. Four typical types of sensor failures, namely, bias, drift, complete failure and precision degradation are tested for monitoring IAQ. Acknowledgement: This work was supported by the Korea Science Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology (No. 2010-0001860) and the Seoul R&BD Program (CS070160).