

## Multiphase Statistical Method for Modeling and Online Monitoring Indoor Air Quality in a Subway

Shi Honglan, Liu Hongbin<sup>1</sup>, 유창규\*  
경희대학교; <sup>1</sup>KyungHee University  
(ckyoo@khu.ac.kr\*)

The multivariate statistical process control techniques for multiphase batch processes are useful and applicable in real industrial processes such as indoor air quality (IAQ) modeling in subways. In multiphase processes, different phases have different variable correlation structures. Before multiphase batch process modeling, it is necessary to divide phases based on some detectable landmark events. Phase-based sub-principal component analysis (sub-PCA) can be applied to monitor IAQ in subways. The monitoring and fault diagnosis results reveal that the sub-PCA method is useful in this process. A series of sub-PCA models can be built for each modeling phase. Then Hotelling's  $T^2$  and squared prediction error (SPE) statistics are utilized in fault detection. Finally, since multiphase partial least squares can take the batch dynamics into consideration, it can be applied in online quality prediction in the IAQ process.

### Acknowledgements

This work was supported by a National Research Foundation of Korea (NRF) grant funded by the Korean government (MEST) (No. 2008-0061908).