

CVA based batch process monitoring using statistics of local observations

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Various monitoring techniques have been developed to analyze multi-way data for fault detection in batch processes. Two kinds of multi-way principal component analysis (MPCA), as representative approaches, have been discussed for efficient batch process monitoring. One is based on batch-wise unfolding, so called MacGregor's approach and the other is variable-wise unfolding, so called Wold's approach. Though the former needs to estimate unknown future observations for on-line monitoring, it can analyze not only cross-correlation among variables but time-dependency (auto-correlation) for temporal (dynamic) data. On the contrary, the latter needs not to estimate future observations but is not easy to analyze auto-correlation except mean trajectories of measurements. In this study, we propose a new batch-wise unfolding based method using multi-way canonical variate analysis (MCVA) to cope with each limitation of the previous researches. The proposed approach uses statistics of local observation for on-line batch process monitoring. To verify the performance of the proposed, we apply it to a fed-batch penicillin cultivation process with several abnormal scenarios.