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SYSTEM ENGINEERING

在线自适应数次过程监视的双滑动窗口MPCA方法

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摘要 Online monitoring of chemical process performance is extremely important to ensure the safety of a chemical plant and consistently high quality of products. Multivariate statistical process control has found wide applications in process performance analysis, monitoring and fault diagnosis using existing rich historical database. In this paper, we propose a simple and straight forward multivariate statistical modeling based on a moving window MPCA（multiway principal component analysis） model along the time and batch axis for adaptive monitoring the progress of batch processes in real-time. It is an extension to minimum window MPCA and traditional MPCA. The moving window MPCA along the batch axis can copy seamlessly with variable run length and does not need to estimate any deviations of the ongoing batch from the average trajectories. It replaces an invariant fixed-model monitoring approach with adaptive updating model data structure within batch-to-batch, which overcomes the changing operation condition and slows time-varying behaviors of industrial processes. The software based on moving window MPCA has been successfully applied to the industrial polymerization reactor of polyvinyl chloride（PVC）process in the Jinzi Chemical Company of China since 1999.

关键词 监测诊断工; 在线自适应系统; 复杂生域分分析; 聚合反应; 线工过程;

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Double Moving Window MPCA for Online Adaptive Batch Monitoring

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Abstract Online monitoring of chemical process performance is extremely important to ensure the safety of a chemical plant and consistently high quality of products. Multivariate statistical process control has found wide applications in process performance analysis, monitoring and fault diagnosis using existing rich historical database. In this paper, we propose a simple and straight forward multivariate statistical modeling based on a moving window MPCA（multiway principal component analysis） model along the time and batch axis for adaptive monitoring the progress of batch processes in real-time. It is an extension to minimum window MPCA and traditional MPCA. The moving window MPCA along the batch axis can copy seamlessly with variable run length and does not need to estimate any deviations of the ongoing batch from the average trajectories. It replaces an invariant fixed-model monitoring approach with adaptive updating model data structure within batch-to-batch, which overcomes the changing operation condition and slows time-varying behaviors of industrial processes. The software based on moving window MPCA has been successfully applied to the industrial polymerization reactor of polyvinyl chloride（PVC）process in the Jinzi Chemical Company of China since 1999.

Key words moving window; multiway principal component analysis; batch monitoring;

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