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SYSTEM ENGINEERING

基于Fisher子空间特征提取的间歇过程监控和故障诊断

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摘要 Multivariate statistical process control methods have been widely used in biochemical industries. Batch process is usually monitored by the method of multi-way principal component analysis (MPCA). In this article, a new batch process monitoring and fault diagnosis method based on feature extract in Fisher subspace is proposed. The feature vector and the feature direction are extracted by projecting the high-dimension process data onto the low-dimension Fisher space. The similarity of feature vector between the current and the reference batch is calculated for on-line process monitoring and the contribution plot of weights in feature direction is calculated for fault diagnosis. The approach overcomes the need for estimating or filling in the unknown portion of the process variables trajectories from the current time to the end of the batch. Simulation results on the benchmark model of penicillin fermentation process can demonstrate that in comparison to the MPCA method, the proposed method is more accurate and efficient for process monitoring and fault diagnosis.

关键词 batch monitoring, fault diagnosis, feature extract, Fisher discriminant analysis, penicillin fermentation process,
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Monitoring and fault diagnosis for batch process based on feature extract in Fisher subspace

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Abstract Multivariate statistical process control methods have been widely used in biochemical industries. Batch process is usually monitored by the method of multi-way principal component analysis (MPCA). In this article, a new batch process monitoring and fault diagnosis method based on feature extract in Fisher subspace is proposed. The feature vector and the feature direction are extracted by projecting the high-dimension process data onto the low-dimension Fisher space. The similarity of feature vector between the current and the reference batch is calculated for on-line process monitoring and the contribution plot of weights in feature direction is calculated for fault diagnosis. The approach overcomes the need for estimating or filling in the unknown portion of the process variables trajectories from the current time to the end of the batch. Simulation results on the benchmark model of penicillin fermentation process can demonstrate that in comparison to the MPCA method, the proposed method is more accurate and efficient for process monitoring and fault diagnosis.

Key words batch monitoring; fault diagnosis; feature extract; Fisher discriminant analysis; penicillin fermentation process,

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本刊中 包含“batch monitoring”的 相关文章
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