中国化学工程学报 2005 13 (5) 62-67 ISSN: 1004-054x CN: 11-3029/TQ

SYSTEM ENGINEERING

基于VPLS的TE过程统计产品质量与费用控制

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收稿日期 修回日期 网络版发布日期 接受日期

摘要 Product quality and operation cost control obtain increasing emphases in modern chemical system engineering. To improve the fault detection power of the partial least square (PLS) method for quality control, a new QRPV statistic is proposed in terms of the VP (variable importance in projection) indices of monitored process variables, which is significantly advanced over and different from the conventional Q statistic. QRPV is calculated only by the residuals of the remarkable process variables (RPVs). Therefore, it is the dominant relation between quality and RPV not all process variables (as in the case of the conventional PLS) that is monitored by this new VP-PLS (VPLS) method. The combination of QRPV and T2 statistics is applied to the quality and cost control of the Tennessee Eastman (TE) process, and weak faults can be detected as quickly as possible. Consequently, the product quality of TE process is guaranteed and operation costs are reduced.

关键词 产品质量； 偏最小二乘法； 多元统计； 质量； 产品管理； 控制系统；

分类号

DOI:

VPLS Based Quality and Cost Control for Tennessee Eastman Process

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Received Revised Online Accepted

Abstract Product quality and operation cost control obtain increasing emphasis in modern chemical system engineering. To improve the fault detection power of the partial least square (PLS) method for quality control, a new QRPV statistic is proposed in terms of the VP (variable importance in projection) indices of monitored process variables, which is significantly advanced over and different from the conventional Q statistic. QRPV is calculated only by the residuals of the remarkable process variables (RPVs). Therefore, it is the dominant relation between quality and RPV not all process variables (as in the case of the conventional PLS) that is monitored by this new VP-PLS (VPLS) method. The combination of QRPV and T2 statistics is applied to the quality and cost control of the Tennessee Eastman (TE) process, and weak faults can be detected as quickly as possible. Consequently, the product quality of TE process is guaranteed and operation costs are reduced.

Key words partial least square method; Tennessee Eastman process; statistical quality control; cost control; on-line monitoring

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