

过程系统工程

## 改进k-means聚类算法多模型建模的一种新的评价函数

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收稿日期 2006-8-29 修回日期 2007-4-2 网络版发布日期 2007-8-3 接受日期

**摘要** pH中和过程的建模与控制一直是过程控制领域的难题。针对pH过程, 提出了一种基于新性能评价函数的k-means聚类算法的多模型建模方法。针对k-means聚类算法中普遍存在的k值已知以及对初始点依赖严重的问题, 在k-means聚类算法的基础进行改进, 并且引入一个自定义的聚类效果评价函数确定聚类个数, 然后采用偏最小二乘PLS算法建立相应的局部线性化模型。通过仿真研究, 利用本文算法建立的多模型, 获得到了良好的跟踪效果, 验证了该改进算法的可行性和有效性。

**关键词**

[k-means聚类](#) [性能评价函数](#) [pH中和过程](#) [偏最小二乘算法](#)

分类号

## Multi-modeling of pH neutralization processes using improved k-means clustering based on new validity function

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### Abstract

The modeling and control of pH neutralization processes is a difficult problem in the field of process control. A multi-modeling method using an improved k-means clustering based on a new validity function is proposed in this paper. There are some common problems, including the number of clusters assumed as a priori knowledge and initial cluster centers selected randomly for classical k-means clustering. The proposed algorithm is used to compute initial cluster centers and a new validity function is added to determine the appropriate number of clusters, then partial least squares (PLS) is used to construct the regression equation for each local cluster. Simulation results showed that multiple models using the proposed algorithm gave good performance, and the feasibility and validity of the proposed algorithm was verified.

### Key words

[k-means clustering algorithm](#) [validity function](#) [pH neutralization processes](#) [partial least squares](#)

DOI:

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