

过程系统工程

一类间歇生产过程的迭代学习控制算法及其收敛性分析

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摘要

针对基于迭代学习控制的间歇过程产品质量优化控制算法难以进行收敛性分析的难题, 并且考虑到实际生产中存在外部干扰和不确定因素的影响, 本文对间歇过程模型参数动态更新问题进行了分析, 建立了间歇生产过程产品质量的神经模糊(NF)预测模型, 提出了一种新颖的批次轴参数自适应调节算法。在此基础上, 构造了一种基于数据驱动的间歇生产过程产品质量迭代学习控制算法, 并对优化问题的收敛性给出了严格的数学证明。最后, 将本文提出的算法用于一类典型的间歇过程终点质量控制研究, 仿真结果验证了本文算法的有效性和实用价值, 为间歇过程的优化控制提供了一条新途径。

关键词

[间歇过程](#) [迭代学习](#) [神经模糊模型](#) [优化算法](#)

分类号

An iterative learning control algorithm with convergence analysis for batch processes

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Abstract

It is difficult to analyze the convergence of iterative learning optimal control for quality control of batch processes, and there exist the disturbance and uncertainties in practical processes. In this paper, a neural fuzzy (NF) model-based approach was used to predict the quality of product and an adaptive update algorithm in the direction of batch was also presented after analyzing the problem of parameters dynamic updating. On this basis, an iterative learning control algorithm with convergence analysis for batch processes was proposed. Moreover, the convergence of the proposed algorithm was analyzed and the rigorous proof was given. Lastly, to verify the efficiency of the proposed algorithm, the algorithm was applied to a classical batch process, and the simulation results showed the efficiency and practicability of the proposed method. Thus it provides a new way for the control of batch processes.

Key words

[batch process](#) [iterative learning](#) [neural fuzzy model](#) [optimization algorithm](#)

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