

过程系统工程

炼焦生产过程质量产量能耗的集成优化控制

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摘要

针对炼焦生产过程强非线性、大时滞等特点, 基于过程参数的主元分析和灰色关联分析, 建立了焦炭质量、产量及焦炉能耗的神经网络预测模型和以焦炭质量为约束条件, 产量、能耗为目标函数的优化控制模型。提出一种融合模糊C均值聚类粗优化和差分进化细优化的集成优化控制方法, 进行过程参数的优化并给出操作优化指导。系统仿真结果表明, 该方法能有效地抑制工况的波动, 达到高产、优质、低耗的生产目标, 为复杂工业过程的建模和优化控制提供了一种新思路。

关键词

[炼焦生产过程](#) [神经网络预测模型](#) [优化控制模型](#) [模糊C均值聚类](#) [差分进化](#) [集成优化控制](#)

分类号

Integrated optimal control of coke quality, coke yield and energy consumption for coking process

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Abstract

To deal with the problem of the strong non-linearity and large time delay in the coking process, the neural network prediction model for coke quality and coke yield, energy consumption of coke oven and the optimal control model with coke quality as constraint, coke yield and energy consumption as objective function were established based on principal components analysis and grey relational analysis of the process parameters. An integrated optimal control method, which combined fuzzy C-means clustering to realize coarse optimization and combined differential evolution to realize fine optimization, was proposed to optimize the process parameters and provide guidance for operation optimization. The simulation results showed that the method was efficient in restricting the fluctuation of operating conditions to achieve the production target of high coke yield and good coke quality at low energy consumption. It provided a new idea for the modeling and optimization control of complex industrial processes.

Key words

[coking production process](#) [neural network prediction model](#) [optimization control model](#); [fuzzy C-means clustering](#) [differential evolution](#); [integrated optimal control](#)

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