

论文

带式输送机拉紧装置张力的灰色预测PID控制

董立红, 赵鹏兵

西安科技大学 计算机科学与技术学院, 陕西 西安 710054

摘要:

针对带式输送机拉紧装置张力控制系统的非线性和时变性, 基于灰色预测PID控制理论设计了拉紧装置的张力控制系统。建立的灰色系统模型可以描述被控对象的不确定性和不完全性, 灰色预测PID控制以系统的行为数据为采样信息来获取系统的发展规律, 并根据系统未来的行为趋势确定系统的超前控制量。仿真分析和实验结果均表明, 灰色预测PID控制具有响应速度快、控制精度高、鲁棒性强、抗干扰能力强等优点, 其能够很好地满足带式输送机拉紧装置张力控制系统动态性能的要求。

关键词: 带式输送机; 拉紧装置; 张力控制; 灰色预测; PID控制

Grey predictive PID control of the tensioning device system in belt conveyor

Abstract:

According to the nonlinearity and time-variation of the tension control system in belt conveyor, a new kind of tension control system based on the grey prediction PID control theory was designed. The established grey system model could describe the uncertainty and incompleteness of the controlled object, the grey predictive PID control could obtain the law of the system development base on sampling information of the system behavior data, then, the advanced control input could be determined on the basis of the system future behavior trends. Simulation analysis and experimental results show that the grey predictive PID controller has fast response, high control precision, strong robustness, strong interference suppression ability and other advantages, and it can meet the dynamic performance requirements of the tension control system in belt conveyor.

Keywords: belt conveyor; tensioning device; tension control; grey prediction; PID control

收稿日期 2012-06-18 修回日期 2012-08-30 网络版发布日期 2013-03-05

DOI:

基金项目:

国家自然科学基金资助项目(11072190)

通讯作者: 董立红

作者简介: 董立红(1968—), 女, 河北丰南人, 副教授, 博士

作者Email: zhpb83@163.com

参考文献:

本刊中的类似文章

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(1130KB)
- ▶ [HTML全文]
- ▶ 参考文献PDF
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 带式输送机; 拉紧装置; 张力控制; 灰色预测; PID控制

本文作者相关文章

- ▶ 董立红
- ▶ 赵鹏兵

PubMed

- ▶ Article by Dong,L.H
- ▶ Article by Diao,P.B