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热工自动控制

# 球磨机多模型PID型神经元网络控制系统

程启明[1];郑勇[2]

上海电力学院电力与自动化学院[1]
上海大学自动化学院[2]

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摘要
针对球磨机制粉系统的多变量、强耦合、非线性、时变性等特点，提出了采用基于PID型神经元网络的多模型控制方法，在不同工况下系统的时变特性采用多个模型进行描述，而每个模型的控制器则采用PID型神经元网络进行解耦控制。通过在线计算模型匹配程度，选择相应的模型和控制器，组成闭环系统，切换算法实现多模型间无扰切换，同一工况慢时变采用控制器参数自调整来提高鲁棒性。PID型神经元网络是一种特殊的3层前向神经网络，其隐层单元分别为比例(P)、积分(I)和微分单元(D)，各层神经元个数、连接方式、连接权值的初值按PID控制规律确定。仿真结果表明，文中提出的控制方法相比传统控制方法有更好的控制品质，跟踪快、鲁棒性强、解耦好，较好地解决了球磨机系统的时变性、耦合性等问题。

关键词 多模型 切换算法 神经元网络 多变量解耦控制 球磨机制粉系统

分类号 TP 273；TK 23

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本刊中 包含“多模型”的 相关文章
本文作者相关文章
· 程启明
· 郑勇

## Control System of Multi-model PID Neuron Network for Ball Mill

Abstract
As to its multi-variable, strong coupling, nonlinear, time-varying characteristics, the control method of multi-variable PID neuron network for ball mill was introduced, its time-changing characteristic at different working conditions was described by multi-models, the PID neuron network was used as decoupling controller for each model. Through on-line computation of the match-degree of the models used for different working conditions, the corresponding model and controller were chosen to compose closed loop system. The switching algorithm of multi-model was used to overcome disturbance in switching. The weights of PID neuron network was learned to improve the robustness of slow time-varying object under the same working condition. The PID neuron network was actually a kind of 3-layer feed forward neural network, its hidden layer neurons were proportional neuron(P), integral neuron(I) and derivative neuron (D). The numbers of the neurons, the connective forms and primary values of the weights were based on the rules of PID control. The simulation results show that the control method has well quality than traditional control method, it has fast tracking ability, strong robustness, good decoupling ability, it can effectively solve time-varying problem, coupling problem et al.

Key words multi-model switching algorithm neuron network multi-variable decoupling control ball mill pulverizing system

DOI:

通讯作者 程启明 chengqiming@sina.com

作者个人主页 程启明 郑勇