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Brandt-Lin神经网络算法改进及应用于直流拖动

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摘要 随着电力电子技术，微电子技术和新型电机控制理论的快速发展，无刷直流电动机（BLDCM）得以迅速推广。BLDCM不仅保持了直流电动机的动静态调速性能，而且避免了有刷结构带来的固有缺陷，具有体积小、效率高、控制简单等优点。无刷直流调速系统快速性、稳定性和鲁棒性的好坏成为决定电机性能的重要指标。介绍一种将神经网络控制方法应用于一个要求更快更精确的BLDCM控制系统以提高动态响应和鲁棒性。神经网络自适应控制算法的使用，使得参数整定无需繁琐的手动过程，能够根据系统工况变化自动辨识被控参数、自动整定控制器参数，便于显著提高控制精度，减少调节时间，使控制过程具有较高的控制品质。神经网络自适应控制算法采用Brandt-Lin算法，并且对激活函数、学习速率做了一些改进，提高了控制速度及精度。在此算法中还加入了一个非线性函数提高了此神经网络的在高阶系统中的适应性。

关键词 人工神经网络 自整定 电动机 Brandt-Lin算法

分类号

Improved Brandt-Lin neural networks and it’s application in BLDCM

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Abstract

With the development of electric power and electron technique，microelectronic technique and new electromotor control theory，BLDCM spreads rapidly.Not only can it possess the dynamic and static speed regulating performances as the same as the direct current electromotor，but also have the advantages such as avoiding the limitation of electrical brush structure，a smaller capacity，a higher efficiency and easy to control.The speediness，stability and robustness of a BLDCM direct current speed regulation system are the important guidelines in evaluating the performance of an electromotor.This paper introduces a method that uses the neural networks control mode in a faster and more accurate BLDCM control system to increase the dynamic response and robustness.After the application of neural networks self-adapting control algorithm，there will be no manually operation in parameters setting.The control parameters can be recognized and set automatically according to the work condition changes of the system and as a result，the control precision is increased significantly，the regulating time is reduced and the control process has a better control performance.The neural networks self-adapting control algorithm in this paper is Brandt-Lin algorithm and the activation functions as well as learning speed are improved so that the control speed and precision are increased.A nonlinear function is also added in this algorithm that can increase the adaptability of the neural network in higher-order system.

Key words neural networks self-tuning BLDCM Brandt-Lin algorithm

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