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论文与报告

基于定转子电阻误差补偿的感应电动机自适应逆解耦控制研究

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摘要
对于具有多变量、非线性、强耦合、慢时变等特征的异步电动机调速系统, 实现定子磁链与电磁转矩的高精度动态解耦是提高系统性能的关键. 首先通过非线性状态反馈建立感应电动机的积分逆模型, 并在此基础上提出了一个基于定、转子电阻误差补偿的感应电动机自适应逆解耦控制方法, 将补偿后的积分逆模型串联到对象的输入端建立广义被控对象. 复杂的感应电动机调速系统被解耦成电磁转矩与定子磁链的两个独立回路, 利用线性系统理论分别对独立回路进行综合设计, 实现定子磁链和电磁转矩对各自给定值的渐近跟踪. 利用Matlab进行了仿真实验, 实验结果验证了建议方案的有效性和可行性.

关键词 解耦控制 感应电动机 逆系统 变频调速 反馈线性化

分类号

Research on Adaptive Inverse Decoupling Control of Induction Motor Based on Stator and Rotor Resistance Error Compensation

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Abstract
It is important to realize torque and stator flux dynamic decoupling control for an induction motor drive, which is a multi-input and multi-output, nonlinear and strong coupling system. First, an integer inverse model is realized by a nonlinear state feedback system, and the effect of its inverse system precision is anlysized. Second, a stator and rotor resistance variance estimator based on the model reference adaptive system (MRAS) is designed, and an adaptive inverse decoupling control method is proposed based on stator and rotor resistance error compensation. By cascading the inverse system with the induction motor drive system, the drive system is decoupled into two independent linear loops, so that synthesis and design of linear regulators can be done separately using linear system theory. The simulation results have verified the validity of the proposed scheme.

Key words Decoupling control induction motor inverse system adjustable-frequency drives feedback linearization

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