电网技术 2010, 34(5) 122-127 DOI: ISSN: 1000-3673 CN: 11-2410/TM

电力系统

电动汽车双馈电机转子电流最小化控制

丁惜瀛[1],王优胤[2],杨树平[1],王健[1]

1. 沈阳工业大学 电气工程学院，辽宁省 沈阳市 110870； 2. 华北电力大学 电气与电子工程学院，河北省 保定市 071003

摘要：

提出了一种基于双馈电机的电动汽车驱动系统。该系统低速运行状态类似同步机，特性硬；超同步运行时定、转子同时输入能量，调速范围宽、动态响应快；变频器发生严重故障的情况下，电机仍可作为感应电机使用。针对双馈电机定、转子能量双向流通使低速电机电流及驱动功率过大的缺点，采用无功功率控制的方法，降低转子无功功率，实现了转子电流最小化，减小了驱动装置中开关元件的容量等级，获得了较同等级异步电机更低的损耗。利用Matlab/ Simulink对系统的运行性能进行了分析，结果验证了该控制策略的正确性和可行性。

关键词：

Minimal Control Strategy for the Rotor Current of Double-Fed Machine Used in Electric Vehicle

DING Xi-ying1, WANG You-yin2, YANG Shu-ping1, WANG Jian1

1. School of Electrical Engineering, Shenyang University of Technology, Shenyang 110870, Liaoning Province, China;2. School of Electrical and Electronic Engineering, North China Electric Power University, Baoding 071003, Hebei Province, China

Abstract:

A doubly-fed induction motor (DFIM) based driving system for electric vehicle is proposed. When the vehicle goes in low speed, the operation state of DFIM is similar to synchronous machine operated in sub-synchronous condition, and its characteristic curve is rigid; when the vehicle goes in high speed, the operation state of DFIM is similar to synchronous machine operated in super-synchronous condition, this moment electric energy is simultaneously fed to both stator and rotor, so the speed adjustable range of DFIM is wide and its dynamic response is rapid; when frequency converter is out of order, DFIM can be still used as induction motor. To remedy the defect of DFIM that under low speed operation the bi-direction flow of electric energy makes the current in both rotor and stator and as well as the driving power of the motor too high, the reactive power control is adopted to reduce reactive power of rotor, thus the minimization of rotor current is attainted and rated capacity of switch elements used in driving device can be correspondingly reduced, so the loss in DFIM is lower than that in other kinds of induction motors in the same capacity grade. Operation performance of the proposed driving system is simulated by Matlab/Simulink, and simulation results show that proposed control strategy is correct and feasible.

Keywords:

收稿日期 2010-03-23 **修回日期** 2010-04-06 **网络版发布日期** 2010-05-13

DOI:

基金项目:

通讯作者: 丁惜瀛

作者简介:

作者Email: ftsy6409@sina.com;xiyingding@163.com

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