

短文

考虑铁损的电动汽车用永磁同步电机Hamilton镇定控制

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摘要:

电动汽车用永磁同步电机(PMSM)工作于有限能量供电条件下,其铁损对驱动系统的影响不容忽视.对此,首先推导了考虑铁损的PMSM完整动态数学模型,并建立了其端口受控Hamilton模型;然后利用互联和阻尼配置及能量整形方法实现了考虑铁损的PMSM驱动系统的Hamilton镇定控制;最后分析了阻尼参数和铁损对电机转速的影响.仿真结果表明,Hamilton控制可实现系统的快速镇定;系统可有效抑制负载扰动;考虑铁损有助于提高电动汽车PMSM驱动系统的控制性能和控制精度.

关键词: 电动汽车 Hamilton镇定控制 永磁同步电机 铁损

Hamiltonian stabilizing control of permanent magnet synchronous motor considering iron loss for electric vehicle

Abstract:

Permanent magnet synchronous motor(PMSM) works under the energy-limited condition in electric vehicle, so the iron loss impact on the drive system can't be ignored. Therefore, the whole dynamic mathematical model and the port-controlled Hamiltonian model of PMSM considering iron loss are established firstly. Then the Hamiltonian stabilizing control of the PMSM drive system is realized by using the method of interconnection and damping assignment and energyshaping.

Finally, the damping parameter impact on the convergence speed of rotating speed and the iron loss impact on rotating speed control are analyzed. The simulation results show that the proposed Hamiltonian control scheme can perform fast stabilizing of the drive system; the controlled drive system can effectively inhibit the load disturbance; considering the iron loss contributes to the further improvement of control performance and control precision.

Keywords: electric vehicle hamiltonian stabilizing control permanent magnet synchronous motor iron loss

收稿日期 2011-06-09 修回日期 2011-09-22 网络版发布日期 2012-12-13

DOI:

基金项目:

多目标BCC算法研究及其在配电网多故障抢修中的应用;山东大学自主创新基金

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