

论文  
基于输入输出反馈线性化三态Boost DC / DC变换器的新型控制策略

刘兆娟, 刘锦波

山东大学控制科学与工程学院, 山东 济南 250061

摘要:

针对 Viswanathan K为消除普通BOOST DC / DC变换器的非最小相位特性而提出的三态Boost DC / DC变换器, 为进一步提高这种电路拓扑的性能, 在建立了变换器状态空间平均模型的基础上, 针对其多变量、非线性特点, 采用输入输出线性化将其转化为一个完全可控的线性系统, 在此基础上应用现有成熟的线性控制策略进行了控制系统的设计, 并且采用MATLAB进行仿真验证, 结果表明: 这种非线性控制策略可以确保输出电压在大范围内恒定可调, 且即使存在大范围扰动(输入电压和负载变化均较大)的情况下, 系统也可以确保稳定性和良好的动态性能。

关键词: 三态Boost DC / DC变换器 非最小相位系统 输入输出线性化

A new control strategy of a tri state boost DC / DC converter based on input-output linearization

LIU Zhao-juan, LIU Jin-bo

School of Control Science and Engineering, Shandong University, Jinan 250061, China

Abstract:

In order to eliminate the influence caused by the non minimum phase characteristic of a common Boost DC / DC converter, Viswanathan K has proposed a novel tri state Boost DC / DC converter. For enhancing performance, the state space averaging model of this converter was first presented in this paper. Due to the nonlinear nature in this model, an input output feedback linearization technique was adopted, and a complete controllable linear system was obtained. Then a state feedback control strategy was designed based on this linear system. Simulation results show that the proposed control strategy can assure constant output voltage in a wide range, so as to realize the stability of the system during large fluctuation of power supply and load disturbance. Good dynamic performance can also be achieved.

Keywords: tri-state Boost DC / DC converter non-minimum phase input-output feedback linearization

收稿日期 2007-08-10 修回日期 1900-01-01 网络版发布日期 2008-02-16

DOI:

基金项目:

通讯作者: 刘兆娟

作者简介:

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