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系统仿真、建模与控制

宽输入范围高动态响应放电调节器的研究

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Research on Discharge Regulator with Wide Input Range and High Dynamic Response

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摘要

为了满足放电调节电路宽输入范围、高动态响应的要求,针对100 V母线电压的电源控制器放电调节器进行设计,提出基于精确小信号模型的电压电流双闭环控制环路设计方案。通过波特图和仿真分析验证控制回路的稳定性和合理性。最后给出了1.8 kW样机的实验结果,验证了理论分析的正确性。

Abstract

A discharge regulator used in a power controller with 100 V bus voltage is designed. To meet the requirements of wide input range and high dynamic response of the discharge regulation circuit, a voltage and current double closed-loop control loop based on an accurate small signal model is designed. The stability of the control loop is verified by Bode plots, and the rationality of the design is verified by simulations. Finally, the experimental results of a 1.8 kW prototype were given to verify the theoretical analysis.

关键词

宽输入范围;高动态响应;放电调节器;双环控制;精确小信号模型

Key words

wide input range;high dynamic response;discharge regulator;double-loop control;exact small signal model

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参考文献

- [1] Garrigos A, Carrasco J A, Blanes J M, et al. A power conditioning unit for high power GEO satellites based on the sequential switching shunt series regulator[C]//MELECON 2006-2006 IEEE Mediterranean Electrotechnical Conference. Malaga, Spain, 2006:1186-1189.
- [2] Maset E, Ejea J B, Ferreres A, et al. High-efficiency Weinberg converter for battery discharging in aerospace applications[C]//Twenty-First Annual IEEE Applied Power Electronics Conference&Exposition. Dallas, TX, USA, 2006:1510-1516.
- [3] 程新,刘众鑫,沈昂,等.基于电压前馈的DC/DC变换器双闭环控制策略[J].电力电子技术, 2016(7):18-20. Cheng Xin, Liu Zhongxin, Shen Ang, et al. The double loop control strategy for DC/DC converter based on voltage feed-forward control[J]. *Power Electronics*, 2016(7):18-20(in Chinese).
- [4] Weinberg A K, Bolto P R. A high power, high frequency, DC to DC converter for space applications[C]//PESC'92 Record. 23rd Annual IEEE Power Electronics Specialists Conference.Toledo, Spain, Spain, 1992:1140-1147.
- [5] Hung C Y, Lee C Q, Lee H T. Analysis and modeling of Weinberg converter system with output current limiter[C]//IAS'95. Conference Record of the 1995 IEEE Industry Applications Conference Thirtieth IAS Annual Meeting. Orlando, FL, USA, 1995:2430-2437.
- [6] Tang Wei, Lee F C, Ridley R. Small-signal modeling of average current-mode control[J]. *IEEE Transactions on Power Electronics*, 1992, 8(2):747-755.
- [7] 陈进龙.高功率密度空间电源放电变换器的研究[D].哈尔滨:哈尔滨工业大学, 2012. Chen Jinlong. Research on high power density space power supply discharge converter[D]. Harbin:Harbin Institute of Technology, 2012(in Chinese).



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