

自动化

基于片上可编程系统的变频逆变电源设计与实现

刘合金<sup>1</sup>, 李可军<sup>1</sup>, 孙莹<sup>1</sup>, 李如振<sup>2</sup>, 王文莉<sup>2</sup>, 邹振宇<sup>2</sup>

1. 山东大学 电气工程学院, 山东省 济南市 250061; 2. 山东电力工程咨询院有限公司, 山东省 济南市 250013

摘要:

利用Altera公司的Cyclone III系列现场可编程门阵列(field programmable gate array, FPGA), 基于片上可编程系统(system on a programmable chip, SOPC)技术对变频逆变电源进行设计与开发。建立了系统数学模型, 设计了相关控制策略, 实现了硬件电路和系统软件的设计, 并给出了Nios II处理器的相关配置。采用Matlab/Simulink对系统进行了仿真分析, 并搭建了实验平台, 实现了逆变电源的输出电压频率在5~50Hz内连续可调, 验证了本系统设计的有效性、可行性。利用高集成度的FPGA, 采用SOPC技术实现系统设计, 简化了控制系统结构, 并可实现多种高速算法, 具有较高的性价比。

关键词:

Design and Implementation of SOPC-Based Frequency Variable Inverter

LIU Hejin<sup>1</sup>, LI Kejun<sup>1</sup>, SUN Ying<sup>1</sup>, LI Ruzhen<sup>2</sup>, WANG Wenli<sup>2</sup>, ZOU Zhenyu<sup>2</sup>

1. School of Electrical Engineering, Shandong University, Jinan 250061, Shandong Province, China; 2. Shandong Electric Power Engineering Consulting Institute Corporation Limited, Jinan 250013, Shandong Province, China

Abstract:

Utilizing field programmable gate array (FPGA) in the series of Cyclone III manufactured by Alter Co. and based on the technology of system on a programmable chip (SOPC), a frequency variable inverter is developed and implemented. The mathematical model of the inverter and related control strategy are established, then the design of its hardware and software are fulfilled, besides, relevant configuration of Nios II processor is given. The proposed inverter is simulated by Matlab/Simulink, and for this purpose an experimental platform, by which the frequency of inverter's output voltage can be continuously regulated within the range from 5 Hz to 50 Hz, is constructed, thus the effectiveness and feasibility of this design are verified. Utilizing highly integrated FPGA and adopting the technology of SOPC, the structure of control system can be simplified, and various high-speed algorithms can be realized by the designed system, so the proposed frequency variable inverter possesses high price-performance ratio.

Keywords:

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通讯作者: 刘合金

作者简介:

作者Email: sduhj@163.com

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