

电磁采暖系统设计与实现

摘 要

随着国家对煤改电政策的大力提倡，可以将节能环保的电磁加热技术应用在采暖行业，设计安全可靠的电磁采暖加热电源。本文以学校食堂 1000m² 采暖方案作为研究对象，设计了合适的电磁采暖加热电源，对电源和热水锅炉的控制策略进行了分析与研究。

本文首先感应加热的原理、感应加热电源的主电路结构以及负载谐振槽路进行阐述。然后根据学校食堂的 100kW/20kHz 的设计目标，对感应加热电源控制策略研究，包括载频率跟踪设计、水温控制策略研究；在水温控制策略研究中采用模糊 PID 控制策略。其次对感应加热电源硬件进行设计，包括 TMS320LF2812 芯片介绍、主电路系统参数的设计以及控制系统硬件电路设计三个部分。再次根据前面的设计成果进行系统软件设计，包括系统主程序设计、AD 采样程序设计、功率调节程序设计、数字锁相环程序设计四个部分。最后本文对整个系统进行仿真与分析。通过仿真，得出本系统达到设计的要求。

关键词：电磁采暖；模糊 PID；软件锁相环

ABSTRACT

With the national policy of transforming coal into electricity, the energy-saving and environmental protection electromagnetic heating technology can be applied in the heating industry to design a safe and reliable electromagnetic heating power supply. In this paper, taking the 1000m² heating scheme of school canteen as the research object, the appropriate electromagnetic heating power supply is designed, and the control strategy of power supply and hot water boiler is analyzed and studied.

In this paper, firstly, the principle of induction heating, the main circuit structure of induction heating power supply and the load resonant slot circuit are described. Then, according to the design goal of 100kW / 20kHz in school canteen, the control strategy of induction heating power supply is studied, including the load frequency tracking design and the water temperature control strategy; the fuzzy PID control strategy is used in the water temperature control strategy research. Secondly, the hardware of induction heating power supply is designed, including the introduction of tms320lf2812 chip, the design of main circuit system parameters and the design of control system hardware circuit. Thirdly, according to the previous design results, the system software is designed, including four parts: system main program design, AD sampling program design, power regulation program design, digital phase-locked loop program design. Finally, the whole system is simulated and analyzed. Through simulation, it is concluded that the system meets the design requirements.

Key words: Electromagnetic heating; fuzzy PID; software phase locked loop

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