

论文

晶闸管控制的单相 - 三相变换器

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摘要:

提出一种单相电源供电时适用于异步电机传动的单相 - 三相变换器。由于仅采用7个晶闸管和1个移相电容, 该变换装置具有造价低、结构简单的特点。分析该变换器的工作原理及开关过程, 并提出一种基于开环变压变频(variable voltage variable frequency, VVVF)和变压恒频(variable voltage constant frequency, VVCF)控制的单相 - 三相离散跳频控制策略, 用于电机的起动和稳态运行控制, 一方面保证了电机在低频阶段足够大的起动力矩, 另一方面可使电机稳步起动到额定转速。仿真和实验结果表明了该控制策略的有效性以及系统方案的可行性。

关键词: 单相 - 三相变换器 离散跳频技术 交流传动 移相电容 变压变频控制

Thyristor Controlled Single-phase to Three-phase Converter

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Abstract:

This paper presented a thyristor controlled single-phase to three-phase converter suitable for driving an induction motor with a single-phase AC supply. Only seven naturally commutated thyristors and one phase balancer capacitor are employed, so the resulting drive system is cheap and compact. Operating principle and switching sequence were analyzed, moreover a single-phase to three-phase discrete hopping frequency control strategy base on open-loop variable voltage variable frequency (VVVF) and variable voltage constant frequency (VVCF) control was proposed for motor starting and steady state operation. The converter would start the motor with high starting torque, and get the motor up to full speed. The effectiveness of the modulation strategy and the feasibility of the converter were verified by the simulation and experimental results.

Keywords: single-phase to three-phase converter discrete hopping frequency technique AC drives phase balancer capacitor variable voltage variable frequency control

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