AN ANALYSIS PERFORMANCE OF A SINGLE-PHASE INDUCTION MOTOR USING SINGLE-PHASE MATRIX CONVERTER

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ABSTRACT

This paper presents an analysis performance of a Single Phase Capacitor-Start Induction Motor using matrix converter. It can be proved that, Single Phase Induction Motor using Single Phase Matrix Converter able to produce better starting current, starting torque and input voltage utilization. Matrix converter is used to convert power from ac fixed-frequency fixed-voltage to ac variable-frequency variable-voltage without any intermediate dc link. Sinusoidal Pulse Width Modulation (SPMW) technique is used to control the self-commutated device, IGBT. Safe commutation strategy was implemented to avoid voltage spike due to inductive load. Simulation result using SimPower system blocks is presented in this paper.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Power Electronics are based primarily on the switching of the power semiconductor devices. Power electronics application such as energy conservation (compressor, air condition) can save the energy 15-20% of electricity. For example, variable speed compressor air-conditioning systems save up to 30% of energy compared to conventional thermostat-controlled system. With the development of power semiconductor technology, the power handling capabilities and the switching speed of the power devices have improved tremendously [1].

Power semiconductor can be regarded as the brain of the modern power electronics equipment. Power semiconductor devices can be operated as switches by controlling the signals to the gate terminal of the thyristor or base terminal of bipolar transistor. The power semiconductor devices can be categorized into three groups, that is; diodes, thyristor and controllable switches. In this thesis, the focus is on controllable switches that can be turned on and off by low-power control signals such as BJT, MOSFET, IGBT. They are commonly used as power switches in converter designs. These controllable switches are very important for control of voltage and current. It can be divided into three general categories; natural commutation, phase control and ON-OFF controlled device [2].