MODELLING AND SIMULATION OF HYSTERESIS CONTROL ALGORITHM FOR USE IN SINGLE PHASE AC-TO-AC MATRIX CONVERTER

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ABSTRACT

This thesis is illustrated by developing computer simulation models of ac-to-ac single-phase matrix converter (SPMC) using sinusoidal pulse width modulation (SPWM) technique and another algorithm i.e hysteresis control technique. The SPMC act as a frequency changer and the load were used in this simulation are passive load i.e resistance and inductance. As an ac-to-ac converter is a system that delivers ac power with the different amplitude, frequency and phase when energized from an ac source.

The simulation models use the Power System Block Set (PSB) within the MatLab/Simulink (MLS). PBS provides the ability to model and simulate electrical power system and drives within simulink environment. Then the result will be compared with SPICE (Simulation Program with Integrated Circuit Emphasis). The obtained using of switching technique in power electronic is to control the voltage output or output frequency or both.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Power electronics circuits convert electric power from one form to another using electronics devices. Power electronics circuit's functions by using semiconductor devices as switches, thereby controlling and modifying a voltage or current. Nowadays, the power electronics applications are from the high-power conversion equipment such as dc transmission to everyday application such as power supplies for personal computers. Power electronics include applications in which circuits process miliwatts or megawatts.

Typical applications of power electronics include conversion of ac to dc, conversion of dc to ac, conversion of an unregulated dc voltage to regulated dc voltage and conversion of an ac power source from one amplitude and frequency to another amplitude and frequency.

The matrix converter permits direct AC-AC power conversion without an intermediate DC link and therefore represents an 'all silicon' solution as the power converter, removing the need for reactive energy storage components used in conventional rectifier-inverter based systems [3].

The ac-ac matrix converter topology was first investigated in 1976 and then more recently using a generalized high frequency switching strategy [14]. The basic of matrix converter are from a special class of Cycloconverter that was developed in the early 1930s [2].

Earlier work of matrix converter is based on output synthesized from the three-phase input denoted by TPMC. Single-phase matrix converter denoted as