POWER LOSSES AND SWITCHING EFFECTS IN SINGLE PHASE MATRIX CONVERTER FOR RECTIFIER OPERATION

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ABSTRACT

This thesis presents the power losses that arise in single-phase matrix converter (SPMC) as an AC-DC controlled rectifier with respect to frequencies variation.

The Multiple PWM technique was used to synthesize the DC output. Switch commutation arrangements were developed that allow dead time to avoid current spikes of non-ideal switches whilst providing a current path for the inductive load to avoid voltage spikes.

The simulation of model SPMC as a rectifier was done by using MATLAB/Simulink. Loads represented R, RL and RC circuit are used for this investigation.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.0 POWER ELECTRONIC

Power electronics may be defined as the applications of solid-state electronics for the control and conversion of electric power [1]. Power electronics are based primarily on the switching of the power semiconductor devices. With the development of power semiconductor technology, the power-handling capabilities and the switching speed of the power devices have improved tremendously. The development of microprocessors and microcomputer technology has in recent years greatly influences in control and synthesis on the output to the various power electronic converters.

Power electronic has the applications that span the whole field of electrical power systems, with the power range of applications extending from a few VA/Watts to several MVA/MW. The main task of power electronics is to control and convert electrical energy from one form to another. The four main forms of conversion are:-

i. DC-to-AC Conversion (Inverter)
ii. AC-to-DC Conversion (Rectifier)
iii. DC-to-DC Conversion (Chopper)
iv. AC-to-AC Conversion (Cycloconverter)