A SINGLE PHASE CONTROLLED RECTIFIER USING SINGLE PHASE MATRIX CONVERTER TOPOLOGY

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ABSTRACT

This work presents a single phase matrix converter topology (SPMC) controlled using MATLAB/Simulink(MLS). Pulse Width Modulation (PWM) technique was used to calculate the switch duty ratio to synthesize DC output. Safe commutation strategies were developed through an arrangement of commutation switches that allows dead time to avoid spikes due to inductive load. Simulation results for commutation and without commutation strategy presented to verify the proposed operation. The result also shows difference modulation index will increase the average mean of the output voltage.

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND OF STUDY

Power electronics is the application of solid state electronics for control and conversion power. The objective of power electronic is to prove the quality and utilization of electrical power based on the switching of power devices such as diodes, thyristors and transistors. Power electronic converters can be found wherever there is need to modify the form of electrical energy such as modify its voltage, current and frequency.

1.1 MATRIX CONVERTER

Matrix converter has been described to offer an "all silicon" solution or AC-AC conversion, removing the need for reactive energy storage components used in conventional reactive, inverter based system and hence an attractive alternative converter. The single-phase matrix converter (SPMC) was first by Zuckerberger with others works on AC-AC and DC-DC conversion. In this work the SPMC topology are used to operate as a controlled rectifier by suitable switching schemes. Simple resistive load is initially used, followed by simple inductive load.

There was four types of matrix converter, which relates to the type of power conversion DC-AC, AC-DC, DC-DC and AC-AC. Since matrix converter was originally introduced, it has received considerable attention because it offers many