Single-Phase Matrix Converter for Inverter Operation Controlled Using PIC

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ABSTRACT

This paper is concerned on PIC implementation of design for control the Single Phase Matrix Converter (SPMC) operates as inverter. The SPMC circuit composed from four ideal power switches used as frequency converter. It is based on the Peripheral Interphase Controller (PIC) with IGBTs as the power switching device. The SPWM technique was used to synthesize the output. Safe commutation strategy was implemented to avoid voltage spikes due to inductive load.

The target of this project is to generate Sinusoidal Pulse-Width Modulation switching pattern using PIC that is suitable to control single phase matrix converter to control the single phase matrix converter. The proposed design enables the modulation index and the switching frequency to be changed. Results are provided to demonstrate successful. Matlab/Simulink showed the behavior of matrix converter operation.

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CHAPTER 1

INTRODUCTION

1.0   INTRODUCTION

Power electronic has 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 power from one form to another.

Converters come in various topologies for various functions such as frequency changer, rectifier, inverter and chopper [6]. Inverter converts a DC input into an AC output statically with output waveforms ideally sinusoidal.

Single-phase voltage source inverters are widely used for example in standby power supplies, variable speed AC motor drive and shunt active power filter applications for energy transformation [1,2], where bidirectional operation is required. In such applications full control is limited to unidirectional operation. Amongst technique that could be explored includes the use of Power System Block Set in MATLAB/simulink relating to physical representation of models in modeling and simulation. To ascertain validity of other proposal prior to developing other applications, the SPMC technique was used in this work as comparison. The output is being synthesized using the well-known SPWM technique.

Fully controlled frequency changers based on cyclo converter arrangement are similar in topology to those of single phase matrix converters [2]. Operation and maintenance of converters requires expertise to be developed and hence costly manpower. The use of a Matrix Converter in the future reduces the need for learning many varying converter topologies and that is now the subject of current active research [3].