

**A SINGLE PHASE MATRIX CONVERTER OPERATING AS A
RECTIFIER DRIVING CONSTANT POWER LOAD.**

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ABSTRACT

This report presents the study of a Single Phase Matrix Converter (SPMC) operated as an AC-DC controlled rectifier driving the linear and non-linear load (Constant Power Load). The multiple Pulse Width Modulation (PWM) technique are used as its switching operation for synthesizing the output modeling. The analysis of constant power load were conducted in detailed before being compliment in the SPMC system. In this work a simple commutation strategy for implementation in single phase matrix converter provides the required free-wheeling operation similar to those available in other converter topologies is proposed. The commutation strategy used in this work has also shown reduction in spikes, a common phenomenon in matrix converter topologies. The commutation scheme establish a current path for energy to flow during dead-time, the avoiding the generation of voltage spikes. The simulations has been done by using MATLAB/Simulink software to validate the design approach of SPMC. Results from the simulation are presented to express the concept.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Power electronics devices are playing an important role in order to convert electrical energy from one form to another form. Power electronics circuit containing semiconductor devices as switches, thereby controlling the current or voltage. Power electronics circuit is able to convert electrical energy from milliwatts to hundreds of megawatts. The latest invention by using the power electronics devices is an advanced topology named Matrix Converter (MC).

The MC circuit topology was first proposed by Gyugyi [1] in 1976 and offers many advantages such as the ability to regenerate energy back to the utility, sinusoidal input and output current and controllable input current displacement factor [2]. Besides, it has the potential of affording an “all silicon” solution for AC-AC conversion, removing the need for reactive energy storage components used in conventional rectifier-inverter based system. Obviously published studies mainly dealt with three-phase circuit topologies [3-5]. The Single-phase matrix converter (SPMC) was first realized by Zuckerberger [6].