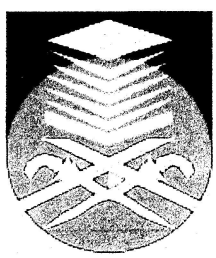
FOUR QUADRANTS DC TO DC CONVERTER USING SINGLE PHASE MATRIX CONVERTER TOPOLOGY

This thesis is presented in partial fulfillment for the award of the Bachelor of Electrical Engineering (Hons)

UNIVERSITI TEKNOLOGI MARA



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ABSTRACT

This work presents a single phase matrix converter topology (SPMC) as a DC Chopper (DC-DC converter) controlled using Xilinx Field Programmable Gate Array (FPGA). Insulated Gate Bipolar Transistor (IGBT) was used for its power circuits, with Xilinx FPGA at heart of its digital control implementations. Pulse Width Modulation (PWM) technique was used to calculate the switch duty ratio to synthesize the DC output. Computer simulation model was developed using MATLAB/Simulink (MLS) to study the basic behavior of SPMC. Resistor, inductor and back emf were used as a load. Safe commutation strategies were developed through an arrangement of commutation switches that allows dead time to avoid voltage spikes due to inductive load then experimental Test-Rig was constructed to verify the operation. Simulation and experimental results for with commutation and without commutation strategy are presented to verify proposed operation.

TABLE OF CONTENTS **PAGE**

CHAPTER 3: REVIEW OF MATRIX CONVERTER

CHAPTER 4: PROPOSE BOOST RECTIFIER OPERATION

CHAPTER 5: MODELING AND SIMULATION