

SIMULATION OF SOFT SWITCHING BIDIRECTIONAL DC/DC CONVERTER USING MATLAB/SIMULINK

This thesis is presented in partial fulfillment for the award of the Bachelor of
Electrical Engineering (Honours)
UNIVERSITI TEKNOLOGI MARA
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ACKNOWLEDGEMENT

All praise to Allah S.W.T, The Most Gracious and Most Merciful, who has given me the strength, ability and patient to complete this project together with its report.

I would like to express my deepest gratitude and appreciation to my project supervisor, En. Mustafar Kamal Bin Hamzah for his invaluable supervision, encouragement, guidance, ideas and opinions for this dissertation.

My warm grace and thank goes to my beloved parents who has given me an infinite support and patience toward the completion of the project. All the supports and advices have boosted my spirit to do the best in this project.

Last but not least, my special gratitude to Faculty of Electrical Engineering UiTM Shah Alam, through the knowledge benefited and to my entire friends who have given me support and contribution to finish this project whether it is directly or indirectly.

The kindness, corporation and support from all of the above mentioned people would always be remembered.

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ABSTRACT

This report present the work carried out in developing computer simulation models of soft switching bi-directional DC/DC converter. This converter is composed from a few topologies and is assembled into two symmetrical parts. With the help of inductor and the transformer leakage inductance, ZVS is realized for all switches in the whole load range.

Moreover, the diode reverse recovery is also reduced with ZCS and the corporation of a designed pulse-width modulation control. These measures reduce switching losses, voltage and current stresses and electromagnetic interference (EMI). In the theoretical analysis, the switching cycle as well as the operation principle of soft switching is described in detail. Simulation results of 500W model is described to show all the switches of converter can operate in the ZVS condition without requiring any additional circuit components. The simulation models was developed using the MATLAB/Simulink.

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CHAPTER 1

INTRODUCTION

1.1 Background of the Project

Power electronic has application that extent the whole field of electrical power system include application in which circuits process milliwatts or megawatts. Nowadays, the power electronics applications are from the high power conversion equipment such as dc transmission to everyday application such as power supplies for personal computer.

The conversion of electric power from one form to another is necessary for the control of electric power and the switching characteristic of the power device permit these conversions.

In the current years, the wide application of uninterruptible power supplies (UPS), distributed power systems (DPS), motor drives and fuel-cell vehicles make the bi-directional DC/DC converter become an important matter of the power conversion. In these applications, bi-directional DC/DC converters give out the solutions by considering the two different electrical behaviors which are; they regulate in direction and quantity of energy flow. Moreover, high power, high efficiency, high voltage, high reliability and soft switching become the demands not only for unidirectional DC/DC converters but also for the bi-directional DC/DC converters. Therefore, the soft-switching bi-directional DC/DC converter is the solution for these entire problems.

Currently, most of the existing DC/DC converter topologies are of low power or one direction power flow and also involving with switching losses, voltage and current stresses and electromagnetic interference (EMI) with regard to the wastage of energy. Meanwhile, there are also high-power, two way of direction