THE BOOST CHOPPER CONTROLLED BY AN 8-BITS MICROCONTROLLER (PIC16F873)

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

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ABSTRACT

This thesis presents a report on a prototype of the closed loop boost chopper controlled by an 8-bit microcontroller. In order to demonstrate the functionality of the converter, the boost chopper operating in the steady state condition has been designed and tested using closed loop and PIC16F873 microcontrollers. System modeling, main design procedures, as well as some hardware and software implementation issues are discussed. The objective of a closed loop boost chopper is to produce a stabilized variable high voltage output. The DC output voltage of the chopper is controlled by reference signals. Experimental and simulation results that demonstrate the performance of the converter are presented.

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CHAPTER 1: INTRODUCTION

1.1 Background of research

Electronic switch-mode DC to DC converters is to convert one DC voltage level to another DC voltage level. This scheme also as known as switched-mode power supply (SMPS), generally perform the conversion by applying a DC voltage across an inductor for a period of time which causes current to flow through it and store energy magnetically. The inductor will transfer the stored energy to the output terminal.

The boost chopper is capable of providing an output voltage that is greater than input voltage. The schematic diagram of boost chopper using an insulated gate bipolar transistor (IGBT) as switching device is shown in figure 1.1. The operation of the boost chopper can also divided into two modes depends on the switching actions in either continuous or discontinuous mode operations [1].

The principles of switching power converter are introduced and details of the boost chopper circuits are discussed in steady state. This conversion method is high efficient often 80% to 95% than linear voltage conversion. This must dissipate unwanted power. The boost chopper consists of a capacitor, an inductor, and switching device. All these devices ideally do not consume any power, which is the reason for the high efficiencies of conversion [6].

The switch is realized with a switched mode semiconductor device, usually an IGBT, MOSFET, GTO and other switching devices. It is switched on and off by the driving square wave signals (PWM) at the gate [1].