SIMULATION OF CASCADED H-BRIDGE MULTILEVEL INVERTER FOR STANDALONE PHOTOVOLTAIC CELL APPLICATION

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

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ABSTRACT

The aim of this project is to analyze the multilevel inverter (MLI) topology in renewable energy field. MLI are being preferred over the conventional two-level voltage source inverters in medium-voltage high-power applications. Among different topologies of MLIs, Cascaded H-Bridge (CHB) MLIs is considered more suitable converters for Photovoltaic (PV) applications since each PV panel can act as a separate DC source for each CHB module. The Sinusoidal Pulse Width Modulation (SPWM) technique was used to synthesis the output waveform. Closed loop system is preferred when there's a need in regulating the output voltage with the input voltage due to changes in load variation by adjusting the duty cycle of the switching pulses.

In this project paper, chapter 1 covers the theoretical and brief introduction on power electronic and the multilevel inverter. The objectives and the research methodology are presented in chapter 2. Brief explanations on the theoretical aspect of the MLI regarding the switching methods, low pass filter and the feedback control for closed loop system are presented in chapter 3. Modeling for the proposed MLI is presented in chapter 4. Chapter 5 covered the simulation results on the switching method, low pass filter and the feedback for the closed loop system. Finally, in chapter 6, the conclusions made after the analysis of the result and also the recommended future work.

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND OF STUDY

Power electronic is one of the important branch of electronic and electrical engineering. It deals with conversion and control of electric energy. The main task of power electronics is to control and convert electrical power from one form to another. Power electronic converters can be found wherever there is a need to modify the form of electric energy such to modify its voltage, current of frequency. The power range of these converters is from some mill watts (as in a mobile phone) to hundreds of megawatts like in a HVDC transmission system. With "classical" electronics, electric current and voltage are used to carry information, whereas with power electronic, they carry power.

Power electronics can guarantees the consistency and stability of the power supply infrastructure of any given country, from electricity generation, transmission and distribution to variety of application in industry such as office appliances and transport systems. Power electronics is not limited to high power scenarios which used in all manner of the system, from high gigawatt, (i.e. in power transmission lines) to very low milliwats range (i.e. power used in mobile phone). Normally, power electronic involves controlling, switching and converting electrical energy using power semiconductor devices. The challenge is to accurately control the energy flow from the supply to the load using electronics switch and also providing low losses.