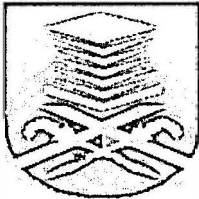


**MODELING POWER ELECTRONICS CONVERTER FOR A WIND
GENERATOR USING PERMANENT MAGNET SYNCHRONOUS
GENERATOR**

Thesis presented in partial fulfilment for the award of the

Bachelor in Electrical Engineering (Hons)

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ABSTRACT

This paper presents AC-DC three-phase uncontrolled rectifier and DC-DC boost converters that can be applied for wind generator application. The objective of this project is to study and model a wind Generator System which consists of a permanent magnet synchronous generator connected to AC-DC three-phase uncontrolled rectifier and DC-DC boost converters and the main objective to obtain regulate output voltage. The output voltage is regulated by a simple PI controller that controls the duty ratio of the boost converter. The AC-DC three-phase uncontrolled rectifier is modeled by three-phase Diode Bridge and power MOSFET is used as the switch DC-DC boost converters. The simulation of the model is done in PSIM simulation and key waveforms and results are presented.

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CHAPTER 1

INTRODUCTION

1.1 Overview

Consumption of the energy based on the conventional fossil fuel is considered as a factor of global warming and environmental pollution. The utilization of natural energy is noticed as a new energy source which replaces conventional energy source. The power generation by natural energy such as solar energy, geothermal energy, wave force, and wind force is proposed. Many laboratories haven't had the wind field environment or wind turbines, and has brought much difficulty to the experiment study of wind generation technology, so modeling and simulation of wind turbines to study their characteristics are essential in the research and development. Wind power generation has a strong connection to rotating machinery and hence its practical application is most promising.

PMSM (Permanent Magnet Synchronous Motor) has reliable and simple structure. Its torque and speed characteristics are better than those of DC motors and asynchronous motors. So in this paper, PMSM is proposed to simulate wind turbine characteristics and realize the complete steady-state and dynamic characteristics simulation, which provide a novel method for simulating wind turbine characteristics in laboratory.

The generator is connected with rectifier circuits; it is assumed that the AC power generated from the generator is converted into DC power through diode bridge rectifier circuits. Three-phase diode rectifier circuits have the characteristics in which the phase of the largest line to line voltage is conducted.

The three-phase rectifier is connected to DC boost converter, with variable input voltages in term of torque ranging from 20 Nm to 100 Nm, this converter has potential uses with wind generator application. DC to DC converter is a circuit which converts a source of direct current DC from one voltage level to another. It is a class of power converter. DC to DC converters are important in portable electronic devices such as cellular phones and laptop