DC SHUNT MOTOR SPEED CONTROL METHODS USING MATLAB/SIMULINK AND INTERFACED WITH GRAPHIC USER INTERFACE (GUI)

Thesis presented in partial fulfillment of the requirement for

Bachelor of Electrical Engineering (Hons.)

UNIVERSITI TEKNOLOGI MARA (UiTM)

MUHAMMAD NAJMI BIN HAMZAH
FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
40450 SHAH ALAM,
SELANGOR, MALAYSIA
MAY 2010

ACKNOWLEDGEMENT

ABSTRACT

This thesis presents simulation model of DC shunt motor speed control method using MATLAB/Simulink software and interfaced with Graphical User Interface (GUI) software. In this thesis, DC shunt motor speed is controlled by armature resistance, field resistance and armature voltage speed control. Its steady state torque-speed characteristics are observed and analyzed. The simulation model will enable an easier understanding for undergraduate electric machinery courses on how the actual machines work. MATLAB/GUI was incorporated in the project to display results obtained. MATLAB/GUI is user friendly and a very helpful tool to determine the speed changes of DC shunt motor.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Electrical engineering undergraduate students taking electric machinery course usually have a problem in understanding DC motor speed control steady-state characteristic theoretically in class. As one of helping tool and alternative way of teaching, author has come out with this project.

The purpose of this project is to design a simulation model of DC motor speed control using MATLAB toolboxes such as Simulink [1] and SimPowerSystems [2] and integrated it with Graphical User Interface (GUI) [3] to enhance the teaching of the steady-state characteristics of DC motor.

There are three major types of DC motors which are self-excited DC motor, separately-excited DC motor and permanent magnet DC motor. Series DC motor, shunt DC motor and compound DC motor comes under the type of self-excited DC motor. As for speed control, DC motors speed can be controlled using several methods such as armature voltage control, field control, armature resistance control, solid-state control, controlled rectifiers and choppers.

This project only focused on the analysis of DC shunt motor speed control steady-state characteristics using armature resistance speed control, armature voltage speed control and field resistance speed control methods. The outcome of this project is DC shunt motor speed control torque-speed characteristic analysis with MATLAB/Simulink and GUI.