CHAPTER ONE
INTRODUCTION

1.1 General

Direct Current motor drives have been widely used where accurate speed control is required. The development of high performance motor drives is very important in industrial as well as other purpose applications. Generally, a high performance motor drive system must have good dynamic speed command tracking and load regulating response.

The DC motors are used in various applications such as defense, industries, robotics etc. DC drives, due to their simplicity, ease of application, reliability and favorable cost have long been a backbone of industrial applications. DC drives are less complex with a single power conversion from Alternating Current (AC) to DC. DC drives are normally less expensive for most horsepower ratings. DC motors have a long tradition of use as adjustable speed machines and a wide range of options have evolved for this purpose [1].

1.2 Problem Statement

The speed control of DC motor problems with a conventional control algorithm is due to the effects of non-linearity of a DC motor. The non-linear characteristics of a DC motor such as saturation and friction could degrade the performance of conventional controllers. Conventional control strategies are of a fixed structure, fixed parameters design, so the tuning and optimization of these controllers is a challenging and difficult task, particular under varying load conditions, parameter change and abnormal models of operation.

1.3 Objectives

The main objectives of this study are to:
   ✓ Design speed control of DC motor system using PID controller.

- ✓ Design speed control of DC motor system using fuzzy logic.
- ✓ Design speed control of DC motor system using neuro-fuzzy controller.
- ✓ Compare the results of all proposed controllers.

1.4 Methodology

- ✓ Study of all previous works.
- ✓ Descriptive analysis of DC motor.
- ✓ Mathematical analysis and computer modeling of DC motor.
- ✓ Design of PID, fuzzy and neuro-fuzzy controllers using MATLAB toolbox.

1.5 Layout

This thesis consists of five chapters: Chapter One represents an introduction to the principles of this work, the reasons and motivation and also discusses the objectives and outline methodologies of the study. Chapter two discuses a theoretical background of DC motor, PID controller, fuzzy system, neural network and neuro-fuzzy controller. Chapter three presents the system control design of speed control of DC motor system. Chapter four presents the simulation results. Finally, Chapter five provides the conclusions and recommendations.