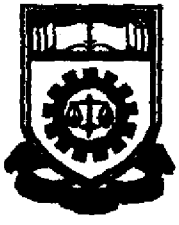
DESIGN OF DIGITAL CONTROLLER FOR AN ARMATURE CONTROLLED MOTOR USING THE DIGITAL APPROXIMATION OF A CONTINUOUS CONTROLLER

Thesis is presented in partial fulfillment for the award of the
Bachelor of Electrical Engineering (Honours)
INSTITUT TEKNOLOGI MARA



NORAINI BINTI AHMAD
Faculty of Electrical Engineering
INSTITUT TEKNOLOGI MARA

ACKNOWLEDGEMENT

Alhamdulillah... Thank you to Allah for gives me the strength and ability to complete this thesis as it is today.

First of all, I would like to express my most sincere gratitude to my supervisor, Prof. Ir. Dr. Abdul Kader Al-Junid for his kindness, advice, patience and time to make sure of the successful of this thesis.

In this opportunity, I would like to thank to all the lecturers who had given me knowledge, advises and valuable information throughout my study period and also to friends who had been together happy and difficult moment during our stay in ITM.

Last but not least, I would like to express my gratitude to my parents, my fiancé all my families for their support, understanding, caring and encouragement. You are the source of my strength and inspiration.

ABSTRACT

A digital controller based on the digital approximation of a continuous controller is designed for an armature-controlled motor. Continuous lead, lag and lead-lag controllers are designed to meet the given specifications. The output responses for each of the compensated systems are then obtained using MATLAB. Several digital approximations of the analogue controller that gives the best response are tried out. The purpose of analysis the system is to find the performance specification such as relative stability, speed of response and the accuracy of the given system. The time response of the digital compensated system using the approximation methods are simulated to compare with the time response of the analogue compensated system, in order to choose the best digital approximation method for the given system.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.0 Introduction

Control system is an integral part of modern society and has numerous applications. The requirements imposed on the control system are usually spelled out as performance specifications. They generally relate to accuracy, relative stability, and speed of response. It is important to note that in control systems design, transient-response performance is usually the most important. We may use analogue, digital or both analogue and digital technique to control a desired physical quantity. But in recent years, there has been a rapid increase in the use of digital controllers in control systems. Even in small-scale control systems, digital controls are used for achieving optimal-performance; for example, in the form of maximum productivity, maximum profit, minimum cost, or minimum energy uses (Gayakwad and Sokoloff, 1988). In many industrial applications, digital and analogue systems coexist in harmony to produce optimum performance.

1.1 Controller

The controller acts on the input error signal to produce an actuating signal, which in turn drives the controlled process, which tries to reduce the error to zero. Figure 1.1 shows the block diagram of a typical closed-loop control system.