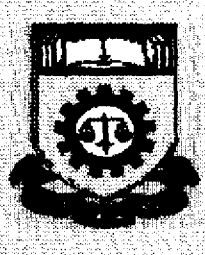
SPEED CONTROL OF A DC SERVOMOTOR USING ANALOGUE CONTROLLER

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



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APRIL 1999

ACKNOWLEDGMENT

In the name of Allah, the Beneficent and the Merciful. It is with the sense of gratitude to the Al-Mighty Allah who gives me strength and ability to complete this project and reports as it is today.

The development of this project was carried out with guidance and advice by my supervisor Prof. Ir. Dr. Tuan Syed Abd. Kader Al-Juned and my grateful thanks are due to him. I owe a great debt of gratitude to him, without whose guidance this project could not have been completed.

I would like also to express my appreciation and gratitude to the Project coordinator, Pn. Rosnani Yahya, all-electrical research and Development Laboratory lecturer and technician for their help and advice.

Finally, I would like to express my appreciation to all friends and whatever parties who have involved directly or indirectly that are not mentioned here for their cooperation and understanding throughout the development of this project.

ABSTRACT

This thesis presents the design of an analogue speed controller for a dc servomotor with unknown transfer function. The transfer function is obtained experimentally, using frequency response techniques.

An approximate expression for the transfer function is obtained from the graphical plot of the experimental data. Then the Root Locus technique is used to design a controller to meet the given specifications.

Simulation of the compensated system using MATLAB shows that it is stable. It has a satisfactory transient response and it improves steady state error.

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CONTENTS **PAGES**

CHAPTER 1

INTRODUCTION

The transfer functions of any systems are either known or can be obtained analytically via the knowledge of the systems and their dynamics. If the transfer function of the system is known, then a number of methods can be used to analyze the system as well as to design a controller. In certain cases, the transfer function of the system may not be known, especially in process industries.

In conventional process control-systems, many methods are applicable for predicting and adjusting the system's performance without resorting to the knowledge of the system's transfer function. However in systems where the classical controller design technique of root locus or Bode plot is to be employed, then it is important to obtain the transfer function first before the controller is designed.

There are many techniques to obtain and identify the transfer function of such systems. One of the techniques that is used to obtain the transfer function of a continuous system is the frequency response method. Frequency response means the steady state response of a system to a sinusoidal input (Houpis, 1988).

To obtain the frequency response, the frequency of the input signal should vary over a certain range and the resulting frequency response is analyzed to obtain its transfer function. The frequency response is useful in situations where the transfer functions of some or all of the blocks in a block diagram are unknown.