CONTROL SYSTEMS ANALYSIS USING MATLAB

By

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Introduction

The engineering field provides many challenges, which must be met. Problems arise every time a system must be constructed, which require fast but also efficient solutions. For these reasons program like Mat Lab has been created, to utilize the speed those computers provide.

In this project, I will attempt to provide some examples that will show exactly how Mat Lab provides meets this requirement and also what other options it provides to the modern day engineers. Specifically, it will deal with the field of control engineering and it will demonstrate the abilities that this program provides for solving problems, designing systems and experimenting with various possibilities available.

More specifically, this project will utilize the various commands Mat Lab has to offer and its designing tool called "Simulink" to create some examples of control systems, like first order, second order and general cases that can be applied to any order system. Those systems will then be used in experiments, which will cover the fundamental theory of control systems through the various commands given by Mat Lab.

This demonstration will be done in the form of labs, that will guide anyone that reads them into the various commands and tools given by Mat Lab to the user in order to complete its task. The user will not be required to know Mat Lab to execute these labs, since they will be written in a form that will allow easy execution of steps to achieve the result. Furthermore, at the end of each lab the resulting characteristic or diagram will be given in order for the user to compare the results and to see if the procedure was executed successfully.

The labs will not deal with all the options available in Mat Lab concerning control systems, since it is impossible to cover such a wide subject. Instead will try to introduce to a new user the way Mat Lab works and to provide a sample of the versatile and flexible interface that this program provides. Upon completing the examples provided the user would have a general understanding of how the various tasks are handled by this program and what he can achieve with a proper use of the options given to him.

A better explanation of what exactly is Mat Lab how it can be used in the field of control engineering is given at chapter 1, which follows. Then, in chapter 2, the first example appears that covers the case of frequency response of a control system by utilizing the Mat Lab workspace. In chapter 3 the time response of the systems used in chapter 2 is examined, again by using the workspace. Finally in chapter 4, an introduction to "Simulink" is made by constructing the block diagrams of some of the control systems

used before and by examining their behavior through a series of changes on the original design.

Therefore, the aim of this project is to teach anyone the way Mat Lab operates, and give the bases for that person to be able, by experimenting and further studying Mat Lab, to expand its knowledge and to use the program for its own benefit. There will be no in depth analysis of any part of the program but instead a general approach will be given to the various tasks handled by the labs. In this way each individual can in its own way "dig" further into the subject that is required for it. Furthermore, this approach will give the chance to new users to familiarize themselves with Mat Lab, without having to specialize on one area of the program. Instead they will get a wide understanding of what Mat Lab is all about.

Having said all these, I would like to encourage anyone that will attempt these examples to experiment with them, thus finding out more about each subject examined by each experiment. In this way it will get the full benefits from those examples and will have the chance to create its own opinion about Mat Lab. Since it all comes out to what this program can do to each one of us individually, getting to know how to work with it by means of experimentation, will result in better utilization of the options available.

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