Lab 9 - PID Controller

Mechtron/ Sfwr Eng 4AA4

What's the Goal

- Learn how to estimate parameters for system identification
- Learn how to simulate a PID controller and a plant using **MatLab** and **Simulink** for determination of suitable values of **Kp**, **Ki** and **Kd** for the **PID controller**

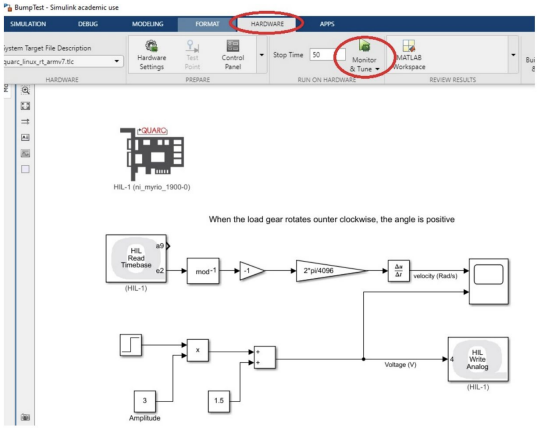
Introduction

- The transfer function for the angular speed of a servomotor can be described as shown to the right
- A is the steady state gain and τ is the time constant.
- There are several methods to determine the transfer function experimentally in the lab. One simple method is called the Bump Test, which is based on a step response of a stable system (PART 1)
- The detailed math and how will be explained in the **Introduction** section of the pdf

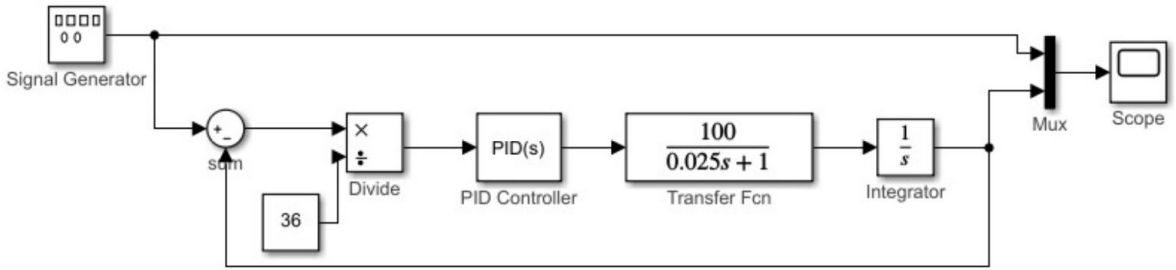
$$\frac{A}{1+\tau s}$$

Part 1 - Find the transfer function (50%)

- You will use Matlab with Simulink to find the exact parameters of the transfer functions
- The detailed way of measurement is clearly outlined in the **Introduction** section of the Lab9.pdf
- You will need to use the **BumpTest.slx** with **Simulink** to play with the hardware
- Based on the plots, calculate the parameters of the transfer functions (**A** and **τ**)



Part 2 - Simulation PID with Matlab/Simulink (50%)

- 

Part 2 - Simulation PID with Matlab/Simulink (50%)

- Use **Simulink** to build a model of the system.
- Construct the model by selecting appropriate blocks from the palette browser and arranging them in the editor.
- Load, save, compile, and simulate the model in Simulink, allowing you to view the simulation data graphically in real-time.
- Simulate the transfer function obtained from **Part 1** and incorporate it with a PID controller to observe the output as you adjust the PID controller values
- Aim to produce an output similar to the provided example in the lab document (Figure 6 in lab9.pdf).
- Record the values of PID controller, save it for the **Lab 10**

Thanks!

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If needed, contact me on Teams (**shil9**)