ENG 4550 – Introduction to Control Systems
Lab 6

YORK UNIVERSITÉ UNIVERSITY redefine THE POSSIBLE.

Lab 6: SRV02 Speed Control
– Step response with PI control

Submission of next lab

1. Lab report (Lab 6)

- Finish your lab report according to the template in Section 3.5.1 and tips in Section 3.5.3.

II. RESULTS

Do not interpret or analyze the data in this section. Just provide the results.

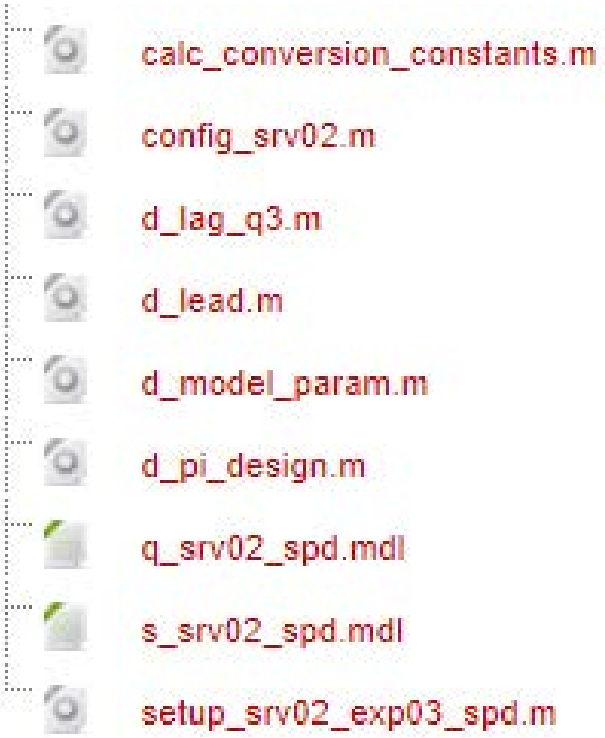
1. Response plot from step 7 in Section 3.3.1.1, *Step response simulation with PI Control*
2. Response plot from step 9 in Section 3.3.1.2, *Step response implementation with PI Control*
3. Signal noise plot from step 10 in Section 3.3.1.2, *Step response implementation with PI Control*
4. Provide data collected in this laboratory (from Table 3.1).

Submission of next lab

Section / Question	Description	Symbol	Value	Unit
Question 2	**Pre-Lab: PI Gains**			
	Proportional Gain	k_p		
	Integral Gain	k_i		
	Open-Loop Time Constant	τ		
	Open-Loop Steady-state Gain	K		
Question 4	**Pre-Lab: DC Gain Estimate**			
	DC Gain Estimate of $P_i(s)$	$\lvert P_i(1)\rvert$		
Question 5	**Pre-Lab: Gain Crossover Frequency**			
	Gain crossover frequency	ω_g		
Section 3.3.1.1	**In-Lab: PI Step Response Simulation**			
	Peak time	t_p		
	Percent overshoot	PO		
	Steady-state error	e_{ss}		
Section 3.3.1.2	**In-Lab: PI Speed Control Implementation**			
	Measured peak-to-peak ripple	$e_{\omega,meas}$		
	Steady-state error	e_{ss}		
	Peak time	t_p		
	Percent overshoot	PO		
Section 3.3.2.1	**In-Lab: Step Response Simulation with Lead Control**			
	Peak time	t_p		
	Percent overshoot	PO		
	Steady-state error	e_{ss}		
Section 3.3.2.2	**In-Lab: Lead Speed Control Implementation**			
	Peak time	t_p		
	Percentage overshoot	PO		
	Steady-state error	e_{ss}		

Lab 6

- In ‘ENG4550 control systems’ on desktop, unzip ‘Lab MatlabSimulink Software-20181001.zip’ to a NEW DIRCTORY. All files you need in Lab 6 are in …/NEW DIRCTORY/Speed Control (Labs 6 and 7)
- When complete, DELETE/REMOVE your files and the FOLDER you created.



Simulation

1. Configuring the SRV02 according to Section 3.4.2.

- In setup_srv02_exp03_spd.m, make sure CONTROL_TYPE is set to '**MANUAL**'. Run setup_srv02_exp03_spd.m.

2. Follow the steps in 3.3.1.1 Simulation .

Experimental test

1. Configuring the SRV02 according to Section 3.4.3.

- Setup q_srv02_pos.mdl: Double-click on the QUARC HIL Initialize block. Select the data acquisition device (q2_usb or q8_usb) you are using. Click on the **Defaults** and **OK** button.
- In setup_srv02_exp03_spd.m, make sure CONTROL_TYPE is set to '**MANUAL**'. Run setup_srv02_exp03_spd.m.

2. Follow the steps in 3.3.1.2 Implementing PI Speed Control.

- Before building the model (Step 7), click QUARC -> Set Default Options to avoid the possible target error.
- The amplitude in Figure 3.13 is wrong.