ENG 4550 – Introduction to Control Systems
Lab 4

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Lab 4: SRV02 Position Control – Ramp Response Using PV Controller

What we will do in Lab 4

1. Simulation
2. Experimental test

Submission of next lab

1. Lab report (Lab 4)

- Finish your lab report according to the template in Section 2.5.2 and tips in Section 2.5.4.

II. RESULTS

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

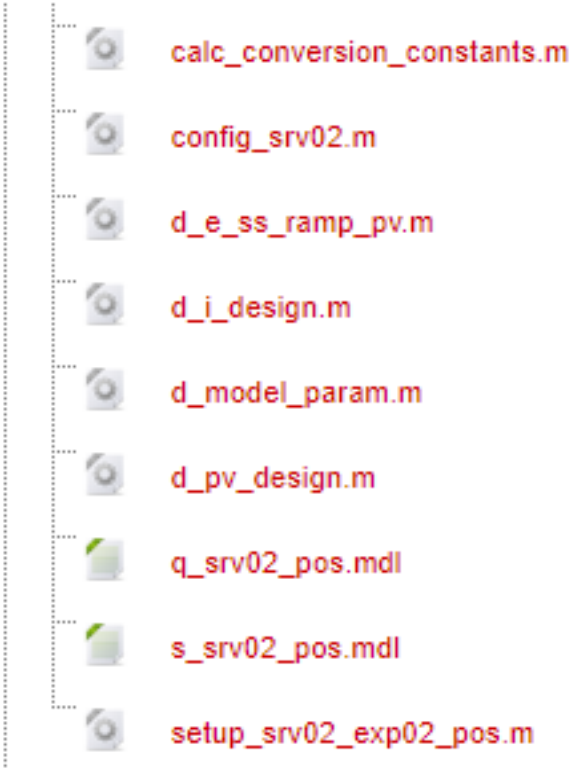
1. Response plot from step 8 in Section 2.3.2.1, *Simulated PV controller with ramp input*
2. Response plot from step 8 in Section 2.3.2.2, *Ramp response of implemented PV controller*
3. Provide applicable data collected in this laboratory (from Table 2.1).

Submission of next lab

	Section / Question	Description	Symbol	Value	Unit
√	Question 4	**Pre-Lab: Model Parameters** Open-Loop Steady-State Gain Open-Loop Time Constant	 K τ		
√	Question 4	**Pre-Lab: PV Gain Design** Proportional gain Velocity gain	 k_p k_v		
	Question 5	**Pre-Lab: Control Gain Limits** Maximum proportional gain	 $k_{p,max}$		
√	Question 6	**Pre-Lab: Ramp Steady-State Error** Steady-state error using PV	 e_{ss}		
	Question 7	**Pre-Lab: Integral Gain Design** Integral gain	 k_i		
	2.3.1.1	**Step Response Simulation** Peak time Percent overshoot Steady-state error	 t_p PO e_{ss}		
	2.3.1.1	**Filtered Step Response Using PV** Peak time Percent overshoot Steady-state error	 t_p PO e_{ss}		
	2.3.1.2	**Step Response Implementation** Peak time Percent overshoot Steady-state error	 t_p PO e_{ss}		
√	2.3.2.1	**Ramp Response Simulation with PV** Steady-state error	 e_{ss}		
√	2.3.2.2	**Ramp Response Implementation with PV** Steady-state error	 e_{ss}		
	2.3.3	**Ramp Response Simulation with with no steady-state error** Steady-state error	 e_{ss}		
	2.3.3	**Ramp Response Implementation with with no steady-state error**			

Lab 4

- In ‘ENG4550 control systems’ on desktop, unzip ‘Lab MatlabSimulin Software-20181001.zip’ to a NEW DIRCTORY. All files you need in this Lab are in …/NEW DIRCTORY/Position Control (Labs 3-5)
- When complete, DELETE/REMOVE your files and the FOLDER you created.



Simulation

1. **Configuring the SRV02 according to Section 2.4 in Workbook.**
   - In setup_srv02_exp02_pos.m, make sure CONTROL_TYPE is set to '**MANUAL**'. Run setup_srv02_exp01_mdl.m.
2. **Follow the steps in Section 2.3.2.1 Simulation.**

Experimental test

1. **Configuring the SRV02 according to Section 2.4 in Workbook.**
   - 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_exp02_pos.m, make sure CONTROL_TYPE is set to '**MANUAL**'. Run setup_srv02_exp01_mdl.m.
2. **Follow the steps in Section 2.3.2.2 Implementing Ramp Response Using PV.**
   - Before building the model (Step 6), click QUARC -> Set Default Options to avoid the possible target error.