**Experimental Bump Test and Model Validation**

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Experiment 3: Position Control

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Section: 09DB

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| --- | --- | --- | --- | --- |
| Section/Question | Description | Symbol | Value | Unit |
| Question 4 | **Pre-Lab: Model Parameters**  Open-Loop Steady-State Gain  Open-Loop Time Constant | κ  τ | 1.53  0.0254 | rad/V\*s  s |
| Question 4 | **Pre-Lab: PV Gain Design**  Proportional Gain  Velocity Gain | kp  kv | 7.82  -0.157 | V/rad  Vs/rad |
| Question 5 | **Pre-Lab: Control Gain Limits**  Maximum Proportional Gain | For 30 deg case  ­kp max | 12.7 | V/rad |
| For 45 deg case  ­kp max | 12.7 | V/rad |
| Question 6 | **Pre-Lab: Ramp Steady-State Error**  Steady-State Error Using PV | ess | 0.214 | rad |
| Question 7 | **Pre-Lab: Integral Gain Design**  Integral Gain | For t=1s case  ki | 38.9 | V/rad\*s |
| For t=1.5s case  ki | 38.9 | V/rad\*s |
| 3.3.1.1 | **Step Response Simulation**  Peak Time  Percent Overshoot  Steady-State Error | tp  PO  ess | 0.198  10.4%  0.000003 | s  rad  rad |
| 3.3.1.1 | **Filtered Step Response Using PV**  Peak Time  Percent Overshoot  Steady-State Error | tp  PO  ess | 0.2  11.6%  0.000001 | s  rad  rad |
| 3.3.1.2 | **Step Response Implementation**  Peak Time  Percent Overshoot  Steady-State Error | tp  PO  ess | 0.163  13.3%  0.009204 | s  rad  rad |
| 3.3.2.1 | **Ramp Response Simulation with PV**  Steady-State Error | ess | 0.062 | rad |
| 3.3.2.2 | **Ramp Response Implementation with PV**  Steady-State Error | ess | 0.056 | rad |
| 3.3.3 | **Ramp Response Simulation with No Steady-State Error**  Steady-State Error | ess | 0.012 | rad |
| 3.3.3 | **Ramp Response Implementation with No Steady-State Error**  Steady-State Error | ess | 0.008 | rad |

1. Analysis
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