

**Department of Chemical Engineering
University of California, Santa Barbara**

ChE 152B

Winter, 2010

Lab 4: Pendulum swing-up and hold control

1. Introduction

Using the file “Lab4_W10_pendulum_handout.pdf” to guide you, perform the experimental activities given. Refer to the handout from lab 1 to operate the pendulum.

2. Pre-lab Analysis

Review the documentation provided to the groups for lab 1, so that you are familiarized with the mechanics of the pendulum/cart experiment.

- Using the Simulink file provided, implement the previous weeks controllers to erect the pendulum
- Tune the stabilization controller to keep the pendulum erected
- Test the controller performance at minimizing the error from upright whilst making the cart follow a trajectory

3. Experimental Activities

- Implement, test, and improve the controller you designed in prelab
- Evaluate performance using criteria of your choice

4. Lab Report

Analyze your results and prepare a lab report using the memo/personal file format described in previous handouts. (Recall the limits on the maximum numbers of figures and tables in the Memo.) Compare the controller settings for different design/tuning methods. Which controller design/tuning method provided the best results?

5. Appendices

- Lab3_W10_pendulum_results.doc
- Lab4_W10_ModelSwingHold.mdl
- Lab4_W10_pendulum_handout.pdf