

ME 560, SPRING 2003, RAHN
LAB 1: Modeling and Parameter Identification

Introduction

In this lab, you are to use either the Torsion or Industrial Servo ECP experiment in the Control Laboratory (243 Reber). The group assignments with lab times are on the course website. This lab gives you a chance to become familiar with the equipment, the ECP control software, and the physics of the experiment. User Manuals for all experiments are available in the drawers next to the experiments. Please leave all user manuals in 243 Reber!

Approach

The objective of this laboratory is to develop an experimentally validated model of your experiment. The laboratory manuals have example models for you to use. Include the flexibility of the shafts and/or belts in your model. Develop a Matlab or Simulink simulation for your plant. Using the step and frequency response from your simulation and the experiment, tune the system parameters to maximize the agreement between theory and experiment. The manual provides directions on how to estimate the model parameters. Although the lab manual recommends adding masses, clamping degrees of freedom, etc., **DO NOT MODIFY THE EQUIPMENT!** Your work should focus strictly on changing the parameters/settings in the ECP software to elicit the desired responses that enable you to identify the system parameters.

Deliverables

The main deliverables for this lab are the dynamic model in state form, plots comparing the experimental and theoretical step and frequency responses, a table of identified system parameters, and a discussion of the discrepancies between theory and experiment. I encourage you to spend some time with the experiments, try to understand how they work, and write a concise, complete, and clear report.