ME 404: Mechatronics II Lab: Experiment 1

Theme: Familiarity with mechatronic system and modeling

Ball screw linear slide: Mechatronics and modeling

Submit one report typed neatly with figures and explaining how you have achieved the set objectives pointwise mentioning procedures, relevant observations and experimental results and mathematical modeling steps clearly. Equations can be hand written.

Caution: Its your responsibility to carry out the tasks mentioned in objectives. Do not take word of TAs unless you are convince.

Expt 1: Familiarity with dSPACE and modeling ball screw linear slider system (This experiment is located in the Robotics Lab, Gr Floor)

Objectives:

(1) To familiarize with programming dSPACE data acquisition system, (develop A/D (force sensor), D/A interfaces in simulink + controldesk to log data + how to save data and use for plotting)
(2) To familiarize with working of linear slide with ball screw interfaced with dSPACE.
(3) Modeling of ball screw linear slide system: Observe carefully and develop mathematical model of the mechanical and mechatronic system. What are important not so important physics? Be in position to defend your proposal for model. Think how would you account/model friction in ballscrew?
(4) Open ended problem:a) think, How to determine parameters of the modeled system b) think how one can determine model parameters for friction model. Or find μ

Some Guidelines:

Get yourself acquainted with dSPACE card and hardware details. Go through manuals/tutorials from web or ask TA for tutorials etc. and finally carry out the tasks mentioned in objective (1).

Draw block diagram of interfacing done for the ball screw linear slide with dSPACE. Identify various elements of mechatronic system for this particular system.

Develop model of system using basic Newtons laws. Do kinematic analysis followed by dynamic analysis using free body diagram or Lagrange formulation.

Tasks 3 and 4 can be carried out at rooms if you find the time limit in the lab.