

MATLAB / SIMULINK - Laboratory # 4

Mathematical Models of Systems

Objectives:

Study the performance of Feedback Control Systems. Effects of a third pole on the second-order system response.

Equipment:

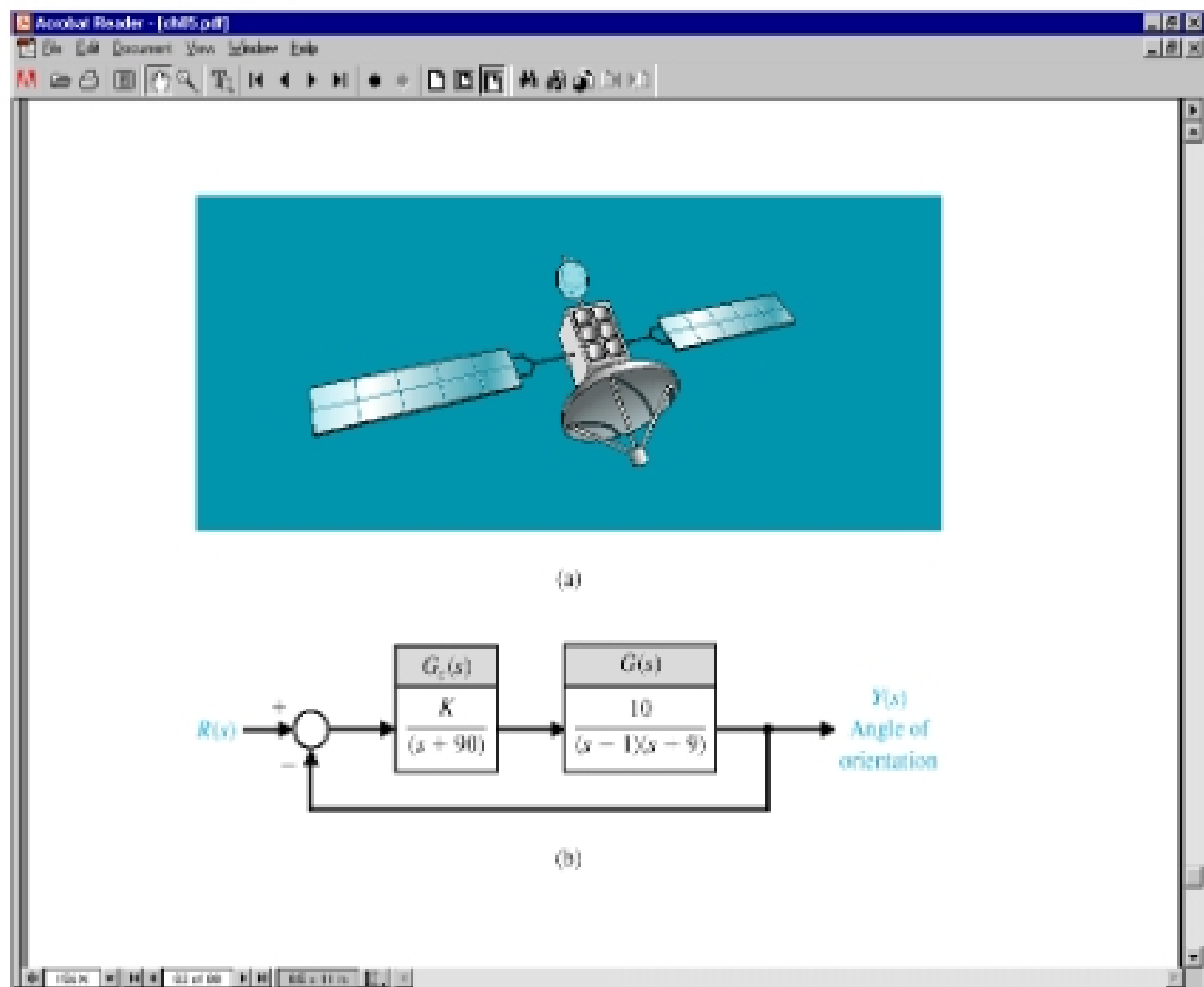
Computer Lab PC

Resources:

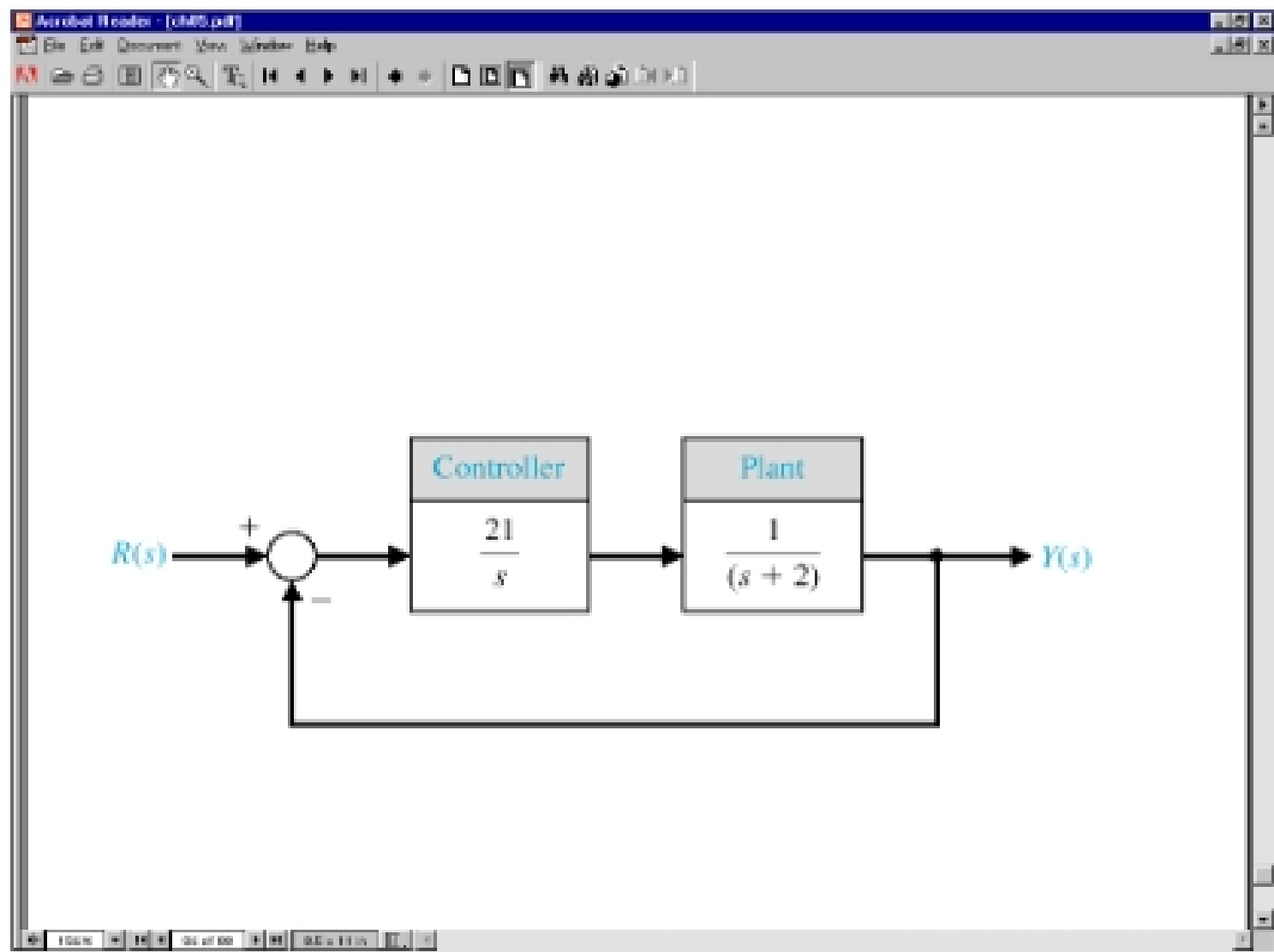
- 1 - Modern Control Systems, Dorf and Bishop
- 2 - Modern Control Systems - Analysis and Design, Bishop
- 3 - MATLAB Control System Toolbox
- 4 - Class Notes

Experiments:

1 – A control system to adjust orientation of a space satellite shown below. Determine a second-order model, for the second-order system (study section 5.4). Using the second-order, select a gain K so that the percent overshoot t is less than 15% and the steady-state error to a step is less than 12%. Verify your design by determining the actual performance of the third-order system. Use Simulink to verify the performance of both systems.



2 – Consider the following control system. Show that the expected percentage overshoot of the closed-loop system response to a unit step is about 50%. Using plot the unit step response of the closed-loop system and estimate the percentage overshoot from the plot. Compare the results; explain differences.



Report

Summarize your observations and attach relevant Simulink diagrams and plots.

Report due next laboratory period.