Homework 2
Course: Automatic Control Systems – ASEN 5114-001 – Spring 2025
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February 8, 2025

"Use the plant and controller models from Homework 1 to explore the effect of control gains on closed loop system poles, and hence the effect on the closed loop natural response of the load shaft angle."

1.

"Find the poles of the plant from your transfer function model from Experiment 1. Plot these in the complex plane."

2.

"Find the poles of the closed loop system from part 5 of Homework 1. Plot these on the same plot as in part 1. above."

3.

"Repeat part 2. above, using a gain factor g in the control law that varies between 0 and 1, in 100 steps. Plot this 'root locus with respect to g' on the same plot as above. Describe the effect of this control system gain on the closed loop poles."

4.

"Repeat part 3. above but use gain values g between 1 and 100. Describe the effect on the closed loop poles."

5.

"Repeat part 4. but use negative g values between 0 and -1."

6.

"What does the above root locus analysis tell you about the effect of the gain g on the closed loop system's natural response? Verify your conclusions by simulating the closed loop step response for several values for g."