Homework #9: ECE 461/661

Meeting Specs, Delays, Unstable Systems. Due Monday, October 23rd
20 points per problem

Meeting Design Specs

1) Assume

$$G(s) = \left(\frac{9111}{(s+1.21)(s+9.02)(s+23.95)(s+44.67)} \right)$$

Design a compensator, K(s), For the 4th-order model that results in

- No error for a step input
- A 2% settling time of 2 seconds, and
- 20% overshoot for the step response

Check your design in Matlab or Simulink or VisSim

Give an op-amp circuit to implement K(s)

Systems with Delays

2) Assume a 100ms delay is added to the system

$$G(s) = \left(\frac{9111}{(s+1.21)(s+9.02)(s+23.95)(s+44.67)} \right) e^{-0.1s}$$

Design a compensator, K(s), For the 4th-order model that results in

- No error for a step input
- A 2% settling time of 2 seconds, and
- 20% overshoot for the step response

Check your design in Matlab or Simulink or VisSim

Give an op-amp circuit to implement K(s)

Unstable Systems

3) Assume the slow pole was unstable

$$G(s) = \left(\frac{9111}{(s-1.21)(s+9.02)(s+23.95)(s+44.67)} \right)$$

Design a compensator, K(s), For the 4th-order model that results in

- No error for a step input
- A 2% settling time of 2 seconds, and
- 20% overshoot for the step response

Check your design in Matlab or Simulink or VisSim