

Homework #9: ECE 461/661

Meeting Specs, Delays, Unstable Systems. Due Monday, October 24th
20 points per problem

Meeting Design Specs

1) Assume

$$G(s) = \left(\frac{903}{(s+0.81)(s+5.20)(s+13.59)(s+25.25)} \right)$$

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

$$G(s) = \left(\frac{903}{(s+0.81)(s+5.20)(s+13.59)(s+25.25)} \right) e^{-0.1s}$$

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

$$G(s) = \left(\frac{903}{(s-0.81)(s+5.20)(s+13.59)(s+25.25)} \right)$$

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