

Advanced Control Methods for Mechatronics

Exercise #1

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Problem 1

Consider the open-loop control system

$$G(s) = \frac{4(s+1)}{s(s+2)(s+0.2)}.$$

Use COMES toolbox and MATLAB to design and implement compensator, which meets the following requirements:

1. Bandwidth 2 rad/s,
2. Error to unit ramps less than 2%,
3. Overshoot less than 10%.

Then, plot the unit step and unit ramp response curves of the compensated system with MATLAB.

Problem 2

Consider the open-loop control system

$$G(s) = \frac{1}{s(s+1)(s+5)}.$$

Design a lag-lead compensator such that the static velocity error constant K_v is 20 sec^{-1} , phase margin is 60° , and gain crossover frequency is 1.25 rad/s. Plot the unit step and unit ramp response curves of the compensated system with MATLAB.