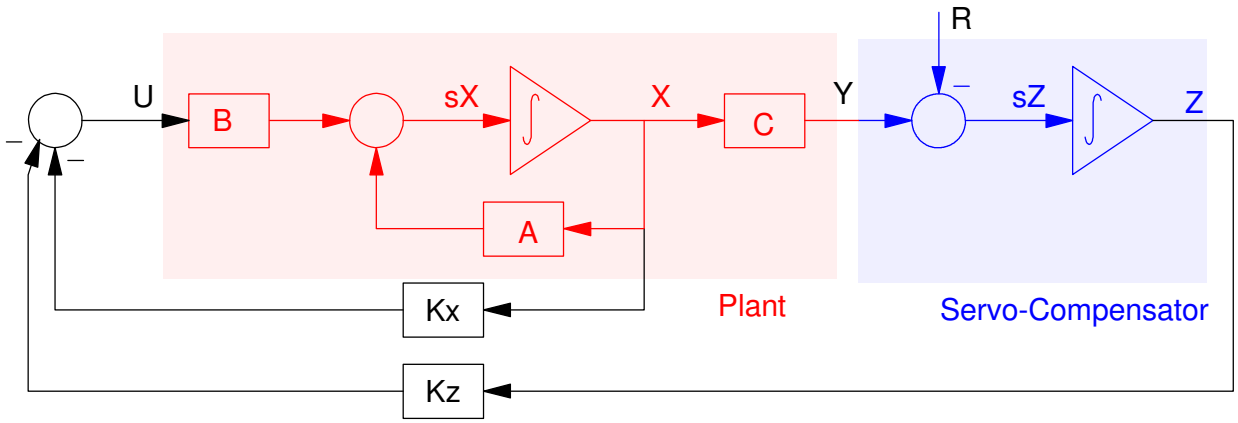
ECE 463/663 - Homework #10

LQG Control with Servo Compensators. Due Monday, April 12th



Cart and Pendulum (HW #7): Use LQG methods to design a full-state feedback control law of the form

$$U = -K_z Z - K_x X$$

$$\dot{Z} = (x - R)$$

for the cart and pendulum system from homework #5 using LQG control so that

- You track constant setpoints,
- You reject constant disturbances,
- The 2% settling time is 6 seconds, and
- There is less than 5% overshoot for a step input.

1) Give the control law (Kx and Kz) and explain how you chose Q and R
2) Plot the step response of the linear system
3) Check your design with the nonlinear simulation of the cart and pendulum system.

Ball and Beam (HW #7): Use LQG methods to design a full-state feedback control law of the form

$$U = -K_z Z - K_x X$$

$$\dot{Z} = (x - R)$$

for the ball and beam system from homework #5 using LQG control so that

- You track constant setpoints,
- You reject constant disturbances,
- The 2% settling time is 6 seconds, and
- There is less than 5% overshoot for a step input.

4) Give the control law (Kx and Kx) and explain how you chose Q and R

5) Plot the step response of the linear system

6) Check your design with the nonlinear simulation of the cart and pendulum system.