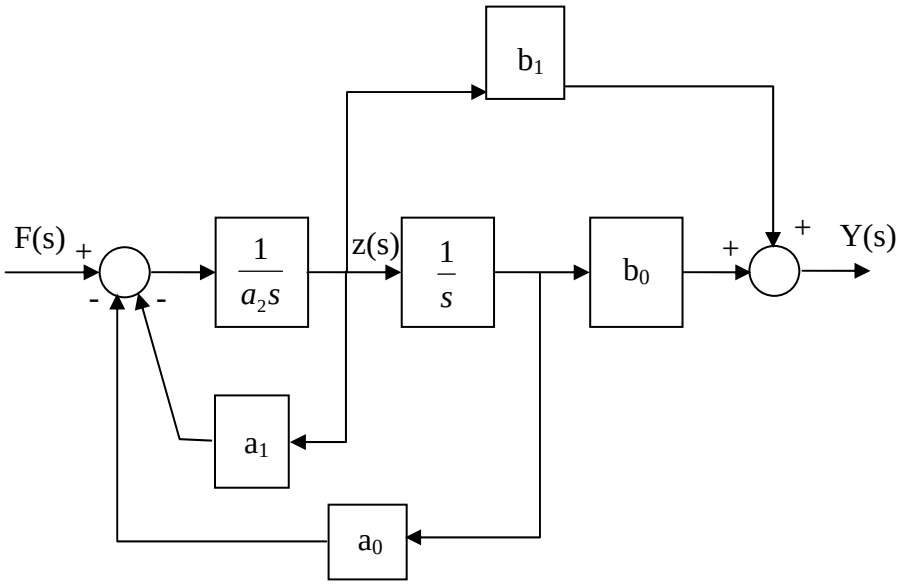
Lesson 27

Problem 27.1

Find the transfer function $\frac{Y(s)}{F(s)}$.

Hint: An intermediate variable, z(s) has been defined to help you. Write F(s) and Y(s) in terms of z(s) and then eliminate z(s).

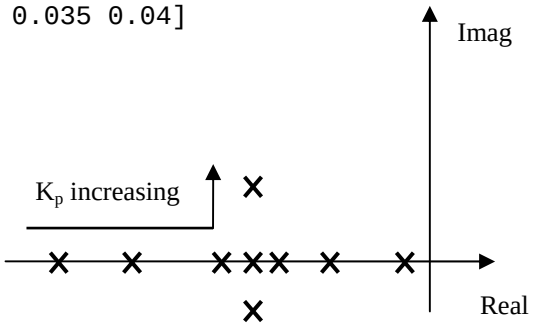


Problem 27.2

Explore pole (roots of the characteristic equation) locations with changing k_p. Start with the p-controller example from class so the characteristic equation is $Js^2 + Bs + k_p$ with B = 0.05 N-s and J = 0.025 kg-m^2. Plot the roots on a Imaginary-Real axes and use values of

k_p = `[0.001 0.005 0.01 0.015 0.02 0.0249 0.025 0.03 0.035 0.04]`

You should get something that looks like the following:



By hand, or using the computer, label the roots for $k_p = 0.001$, $k_p = 0.04$ and for the critically damped case.

You may make this plot in Matlab, Excel, Maple or any other program you'd like. If you use Matlab you will find the "roots" command helpful. You just type > roots([J B kp]) where J, B and kp are numerical values. To find the real part of a number the Matlab command is "real(*number*)" and for the imaginary part you can use "imag(*number*)" where *number* is a complex number.