Homework 3 Problems
Due: Tuesday, April 27th at 4:00 PM

Problems: 3.53a, 3.53b, 3.54a, 3.54c, 3.57

3.53 Suppose that unity feedback is to be applied around the listed open-loop systems. Use Routh's stability criterion to determine whether the resulting closed-loop systems will be stable.

(a) $KG(s) = \dfrac{4(s+2)}{s(s^3+2s^2+3s+4)}$

(b) $KG(s) = \dfrac{2(s+4)}{s^2(s+1)}$

3.54 Use Routh's stability criterion to determine how many roots with positive real parts the following equations have:

(a) $s^4 + 8s^3 + 32s^2 + 80s + 100 = 0$

(c) $s^4 + 2s^3 + 7s^2 - 2s + 8 = 0$

3.57 Consider the closed-loop magnetic levitation system shown in Fig. 3.66. Determine the conditions on the system parameters (a, K, z, p, K_o) to guarantee closed-loop system stability.

Figure 3.66

Magnetic levitation system for Problem 3.57