HOMEWORK ASSIGNMENT #13   DUE 4/25/01

PROBLEMS

Problem A

The block diagrams shown below represent two different approaches for controlling the rotation speed of a motor. The first diagram represents the use of proportional control and the second diagram the use of integral control. Assume $K_m = 150$ and $\tau_m = 0.4$ and that the input (reference speed) is a unit step function.

1. In the case of the proportional controller first determine K so that the steady-state error is 5%. Then determine the motor speed as a function of time and plot your response.
2. In the case of the integral controller determine K so that the overshoot is limited to 5%. Then determine the motor speed as a function of time and plot your response. How does it compare with the results from part 1?

B. Find the modes and natural frequencies of the mass/spring system shown in Figure 3. Show that the modes are orthogonal, i.e. the dot product of the vectors is zero.