

24-352 DYNAMIC SYSTEMS & CONTROL

HOMEWORK ASSIGNMENT #1

DUE 1/24/01

PROBLEMS

1. Kinetic Energy

- Use the concept of equivalent kinetic energy to find the equivalent mass for the system shown in Fig. 1. That is, find M_e in terms of m_1 , m_2 , L_1 and L_2 so that the kinetic energy of the lever system is equal to $\frac{1}{2}M_e(\dot{x})^2$.
- Use kinetic energy to find the equivalent moment of inertia with respect to θ_1 of the system shown in Fig. 2

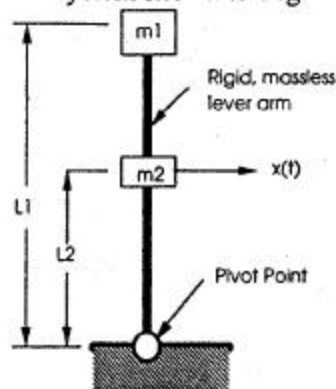


Figure 1

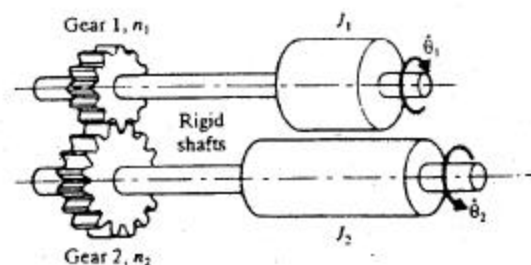


Figure 2

2. Potential Energy

- Use the concept of equivalent potential energy to find the equivalent linear stiffness with respect to x for the system shown in Fig. 3. That is, find K_e so that the potential energy stored in the system is equal to $\frac{1}{2}K_e(x)^2$.
- Use the concept of equivalent potential energy to find the equivalent torsional stiffness with respect to θ for the systems shown in Figures 4 and 5.

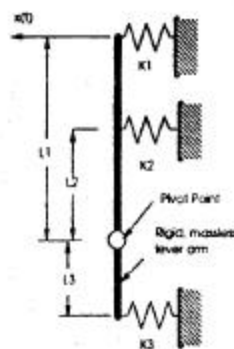


Figure 3

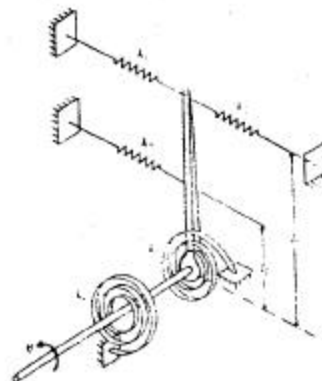


Figure 4

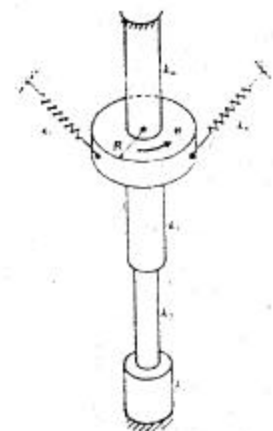


Figure 5