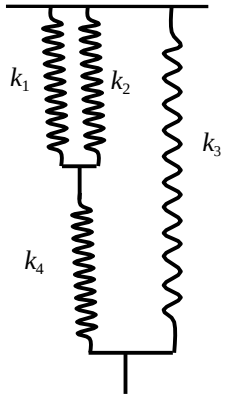
University Centre of Mila

Institute of Science and Technology

Departement of GM & EM

Series N°1
Generalities on vibrations



Exercise 1

Find the equivalent spring constant for the system shown in the diagram.

$k_1 = 2k_2 = 1000Nm^{-1}$, $k_3 = 3k_1$, $k_4 = 5000Nm^{-1}$

Exercise 2

1- Find the equivalent spring constant for the system shown in Figure 1

2- Find the equivalent mass and equivanet spring costant for the system shown in figure 2.

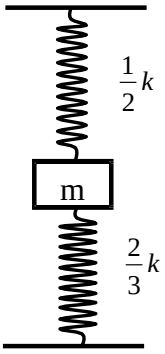


Figure 1

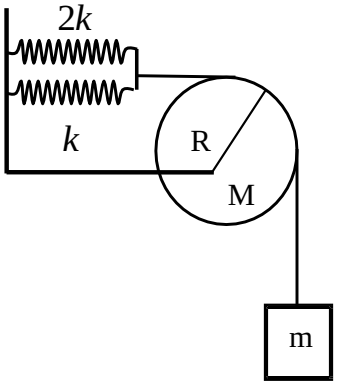
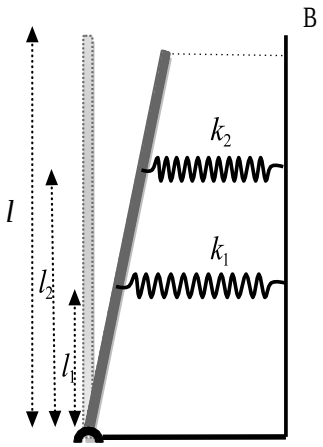


Figure 2

Exercise 3

Determine the equivalent spring constant for the system shown in the adjacent diagram, assuming the bar oscillates with very small angles

1. If the equivalent spring is located at point C.
2. If the equivalent spring is located at point B.
3. If the equivalent spring is located at point A.



Numerical application: $k_1 = 7.10^5\, Nm^{-1}$ $k^2 = 14.10^5\, Nm^{-1}$

Exercise 4

Let *x* be the displacement of the mass *m*, measured positively downward from the equilibrium position of the system. Show that the difference in the potential energy of the system between two arbitrary positions is independent of the mass *m*. In other words, the variation in the system's energy is independent of the gravitational potential energy of the mass.