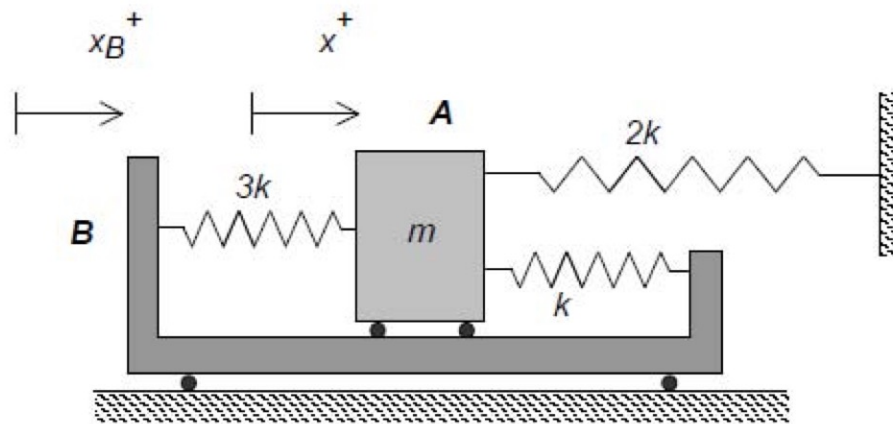


Homework 6.L

Given: Block A (having a mass of m) is attached to cart B with two springs of stiffnesses $3k$ and k , as shown below. A third spring of stiffness $2k$ is attached between A and ground. Cart B is given a prescribed displacement of $x_B(t) = b \cos \omega t$. The absolute motion of block A is described by the coordinate x . All springs are unstretched when $x = x_B = 0$ m. Consider all of the surfaces to be smooth.

Find: For this problem:

- Derive the differential equation of motion for block A in terms of the coordinate x ;
- Determine the numerical value for the natural frequency of this system; and
- Derive the particular solution of the system $x_p(t)$.



Use the following parameters in your analysis: $m = 12$ kg, $k = 800$ N/m, $b = 0.1$ m, and $\omega = 25$ rad/s.