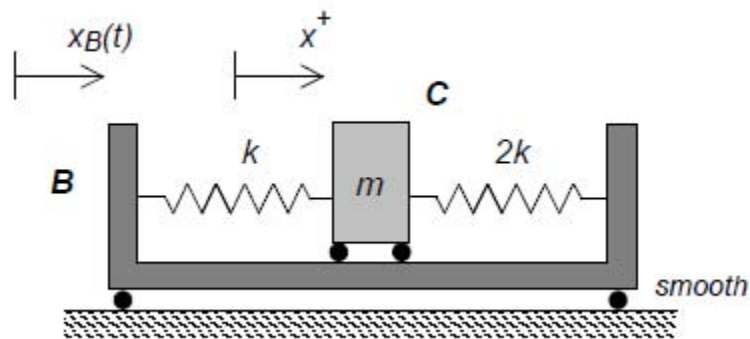


**Homework H.6.L**

**Given:** Block C, having a mass of  $m$ , is attached to a moveable base B by two springs, as shown in the figure below. Base B is given a prescribed horizontal motion of  $x_B(t) = b \sin \omega t$ . Let  $x$  represent the motion of C (measured positively to the right), and let the springs be unstretched when  $x = x_B = 0$  m.

**Find:** For this problem:

- Draw a free body diagram of block C;
- Derive the differential equation of motion for the system in terms of the coordinate  $x$ ;
- Derive the particular solution  $x_p(t) = A \sin \omega t$  for the previously-obtained equation of motion;
- Make a plot of the amplitude of  $x_p$  (i.e.  $|A|$ ) versus the excitation frequency  $\omega$ ; and
- Determine the two positive values of the excitation frequency  $\omega$  for which the amplitude of  $x_p$  is exactly twice the amplitude of the base motion (that is, when  $|A| = 2b$ ).



Use the following parameters in your analysis:  $m = 36$  kg,  $k = 5808$  N/m, and  $b = 0.02$  m.