

### Answer on Question#41045, Physics, Mechanics

#### Question:

In an experiment to determine the period of oscillation of a loaded spiral spring, the equation of a simple harmonic oscillator  $a = -kx$ , where the symbols have their usual meaning, was used. Write down the equation for the angular frequency  $\omega$  in terms of  $k$  and  $m$ .

#### Answer:

The equation of a simple harmonic oscillator:

$$ma = -kx$$

where  $a$  is acceleration,  $m$  is mass,  $x$  is displacement from the equilibrium,  $k$  is the spring constant.

Therefore,

$$\ddot{x} = -\left(\frac{k}{m}\right)x$$

Solving the differential equation above, a solution which is a sinusoidal function is obtained.

$$x(t) = c_1 \cos \omega t + c_2 \sin \omega t$$

where  $\omega = \sqrt{\frac{k}{m}}$  is the angular frequency

Answer:  $\sqrt{\frac{k}{m}}$