

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 ω 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: $\sqrt{\frac{k}{m}}$