

Answer on Question#37874, Physics, Other

Question:

what is the displacement of object performing simple harmonic motion when kinetic and potential energy are equal?

Answer:

Let us consider a harmonic oscillator with total energy which is the sum of kinetic energy T and potential energy U :

$$E = T + U$$

or

$$E = \frac{mv^2}{2} + \frac{kx^2}{2}$$

where m – is a mass of the object, v – its velocity, x – its displacement, k – a coefficient characterizing the system.

If at some moment of time the kinetic energy T is equal to potential energy U then the displacement of the object is

$$x = \sqrt{\frac{mv^2}{k}}$$

or

$$x = \sqrt{\frac{2T}{k}} = \sqrt{\frac{E}{k}}$$