

A sinusoidal wave travels along with. The time for a particular point as move from maximum displacement to zero displacement is 178ms. The wavelength of the wave is 1.38m. Find the period, the frequency and the speed of the wave

Solution:

Time at which the point moves from a position of amplitude in the position of the zero displacement is given in the condition: $t_1 = 178 \text{ ms}$

We have harmonic oscillations (described by a sinusoid).

For reasons of symmetry of sinusoid: $t_1 = t_2 = t_3 = t_4 = 178 \text{ ms}$

Period T - the time at which point performs complete oscillation:

$$T = t_1 + t_2 + t_3 + t_4 = 4 * t_1 = 4 * 178 \text{ ms} = 712 \text{ ms}$$

Frequency n - the number of oscillations per second

$$n = \frac{1}{T} = \frac{1}{712 \text{ ms}} = 1.4044 \text{ Hz}$$

Wavelength - the distance which passes wave in one period:

$$\lambda = v * T, \quad v - \text{speed of the wave}$$

$$v = \frac{\lambda}{T} = \frac{1.38 \text{ m}}{712 \text{ ms}} = 1.938 \frac{\text{m}}{\text{s}}$$

Answer: period T= 712 ms, frequency n = 1.4044 Hz, speed V = 1.938 m/s

