Wave

DATE

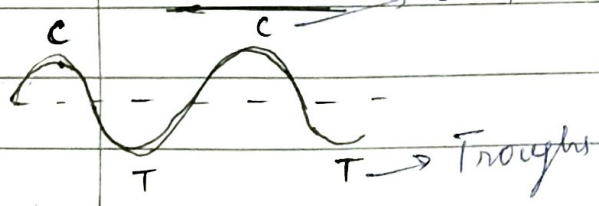
- Wave passes through a medium and its particles execute SHM.
- Velocity of particles during their Vibration is different at the different positions.
- Velocity of wave depends on its medium it does not depends on f, λ and Intensity
- Energy propagated along with the wave motion.
- propagation of wave in medium.
  - (I) Elasticity
  - (II) Inertia
  - (III) Minimum friction amongst the particles
  - (IV) uniform density of medium. of the medi

Types of wave (Medium)

1. Mechanical
   - Require medium for their propagation
2. (II) Non-Mechanical
   - Does not require med. for their prop.
   - (EMW)

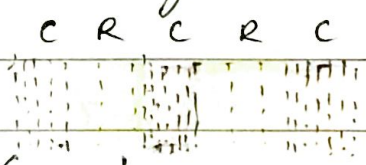
On the Basis of Vibration of particles.

1. Transverse



- its particles Vibrated ⊥ dir to the dir of Propagation of wave.
- it can be polarised

2. Longitudinal.



Max pressure and density (Compression)

Min press and density (Rarefaction)

- its particles Vibrated in dir of wave =
- Does not polarised. =

On the Basis of Energy Propagation.

DATE (11)

1. Progressive

These waves advances in a medium with definite velocity these wave propagate energy in the med.

① Sound wave
② Light wave

Stationary wave

It wave remains stationary bet^n two Boundaries in medium.

① String
② Organ pipes.

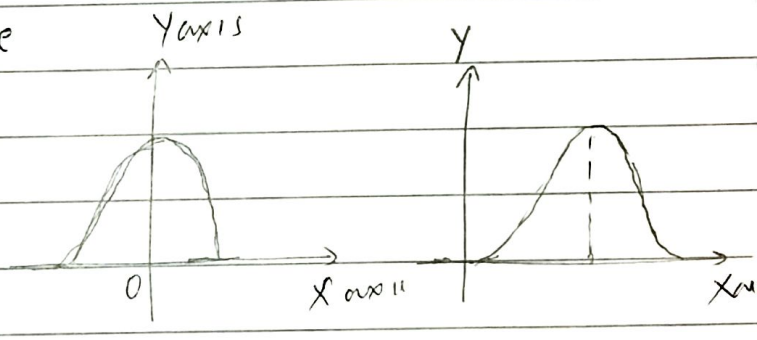
Dimension.

① 1D → energy prop in one dir.
② 2D → energy prop in 2 dirn
③ 3D → " " in 3D dir.)

Sound wave, light wave.

Wave function

Consider one Dim wave Travelling along X-axis



$$y = f(x, t)$$

This is called wave function. pulse at $t=0$ after t sec.

Speed of pulse $= v$

after t sec. its displacement $= vt$ in X dir of +ve.

$$y = f(x - vt)$$

If wave pulse is travelling along $-X$ dir $(-ve)$

$$y = f(x + vt)$$

$\Rightarrow y = (x - vt)^2$

$\Rightarrow y = \sqrt{x - vt}$

$\Rightarrow y = A e^{-B(x-vt)^2}$ classmate

Other form of wave function

Harmonic wave

If a Travelling wave is a sin or cos function of $(x \pm vt)$

$$\frac{\partial^2 y}{\partial t^2} = v^2 \frac{\partial^2 y}{\partial x^2}$$ it is wave equation.

Angular wave number & Propagation constant (k)

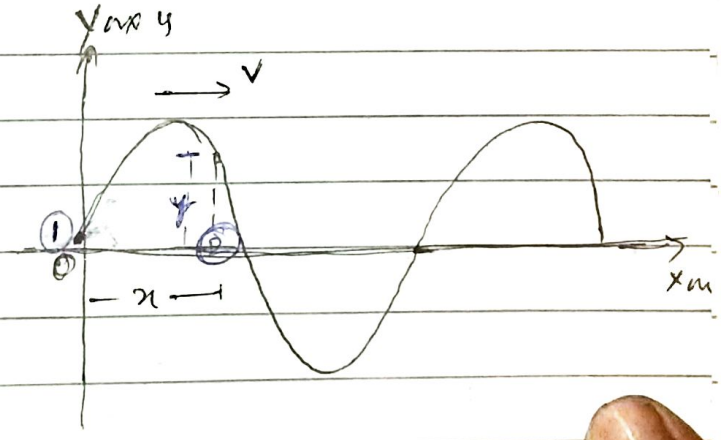
Number of wavelength in the distance 2π is called the wave number.

$$k = 2\pi/\lambda$$ SI unit. rad/m

Equation of a Plane Progressive wave.

If during the propagation of a progressive wave, the particles of medium perform SHM about their mean position then wave is known as Harmonic progressive wave.

If plane simple harmonic wave travels from the origin along the positive dir of x-axis from left to right.



The displ. y of a particles 1 from mean position for the time t s.

$$y = a \sin \omega t$$

speed of wave $= v$

$$t = \frac{x}{v}$$

displacement $$y = a \sin\left(t - \frac{x}{v}\right)$$

$$k = \omega/v$$

$$y = a \sin(\omega t - kx)$$

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