

$$v_{ heta} = v_0 + 0.6 heta ~~when \, P = 1 atm, v_0 = 331.1 ms^{-1}$$

Salid

 $v=\sqrt{rac{E}{
ho}}$

Solid

$$v = \sqrt{\frac{B}{
ho}}$$

$$v=\sqrt{rac{\gamma P}{
ho}}$$

Resonance Tube Experiment

$$\ell = rac{v}{4} imes rac{1}{f} - \epsilon$$

$$\ell+c=rac{1}{4}$$

$$\ell_1+c=rac{3}{4}\lambda$$

Pipes

$$f \propto rac{1}{\ell}$$

Closed Pipes

$$f_0=rac{v}{\lambda_0}=rac{v}{4\ell}$$

$$f_1=rac{v}{\lambda_1}=rac{3v}{4\ell}=3f_0$$

$$f_n=(2n+1)f_0$$

End correction:
$$f_0=rac{v}{\lambda_0}=rac{v}{4(\ell+c)}$$

Open Pipes

$$f_0=rac{v}{\lambda_0}=rac{v}{2\ell}$$

$$f_1=rac{v}{\lambda_1}=rac{v}{\ell}=2f_0$$

$$f_n=(n+1)f_0$$

End correction:
$$f_0=rac{v}{\lambda_0}=rac{v}{2(\ell+c)}$$

Tubes

$$v=\sqrt{rac{T}{\mu}} \quad \mu=rac{m}{\ell}$$

Plucked at middle

$$f_0=rac{v}{\lambda_0}=rac{1}{2\ell}\sqrt{rac{T}{\mu}}$$

$$f_1=rac{v}{\lambda_1}=rac{3}{2\ell}\sqrt{rac{T}{\mu}}=3f_0$$

$$f_n=(2n+1)f_0$$

Plucked at other places

$$f_0=rac{v}{\lambda_0}=rac{1}{2\ell}\sqrt{rac{T}{\mu}}$$

$$f_1=rac{v}{\lambda_1}=rac{2}{2\ell}\sqrt{rac{T}{\mu}}=3f_0$$

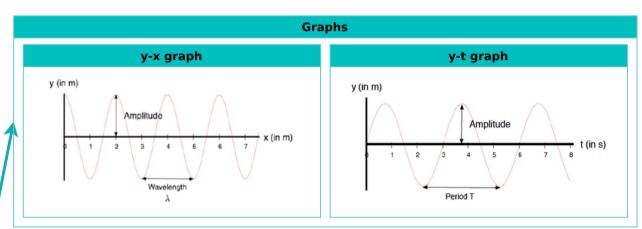
$$f_n=(n+1)f_0$$

Type of Waves

Transverse waves and longitudinal waves

Mechanical waves and electromagnetic waves

Progressive



Doppler Effect

$$f'=rac{v'}{\lambda'}=rac{v+u_o}{v+u_s}f$$

Waves

Sound Waves

About Waves

Wave Equations

Progressive Wave:

$$y=a\sin(\omega t-kx)=a\sin(rac{2\pi t}{T}-rac{2\pi}{\lambda}x)$$

Standing Wave:

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

$$kx = n\pi o antinodes \quad kx = (n + rac{1}{2})\pi o nodes$$

Comparison

Progressive Wave

Energy transferred along direction of propagation

Wave profile move in direction of propogation

Every point along direction of propogation is displaced but at different instant

Every point has same amplitude and

Neighbouring points are not in phase

Standing Wave

No energy transferred along direction of propagation

Wave profile does not move in direction of propagation

Points known as nodes where no displacement occur

Points between two successive nodes have different amplitude

All points between two successive nodes vibrate in phase with each other