Ch 15 Concept

Monday, 26 October 2020 17:45

Superposition

in 1-Dimension

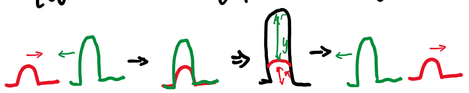
W_1 Amplitude = x

W_2 Amplitude = y

W_1 & W_2 → Resultant = A = x+y

(Applied on Neg. wave)

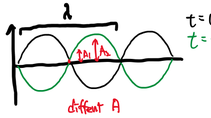
t=0 t=1 t=2

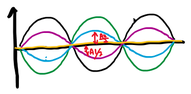


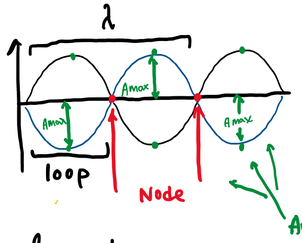
∴ No interference after superposition

Stationary wave

2 identical wave in opposite side







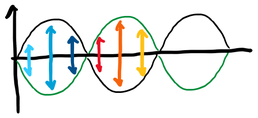
$l_{loop} = \frac{1}{2}\lambda$

Lowest f in stn. wave

→ 1 Loop / longest λ

(const. V)

Phases



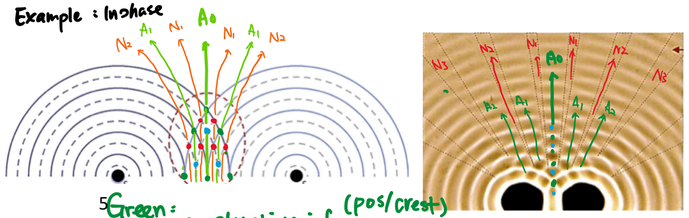
Same colour tone → Inphase

Same Grading → Antiphase

Interference

2 identical wave ONLY

Example : Inphase



Green : constructive inf. (pos/crest)

Blue : (Neg/trough)

Node

Anti-node

Red : destructive inf., calm

Nodes → Nodal line

Anti-nodes → Anti-nodal line

Suffix on Lines A_0 N_1 A_1

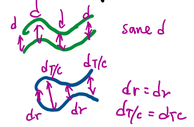
→ Path differences

Coherent

Coherent = same f & same phase relationship

inphase ∈ Coherent

antiphase ∈ coherent



Speed of sound

V = 330 ~ 340 ms^{-1}

Path differences

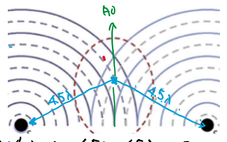
Inphase (figures)

Constructive

pd = nλ

Destructive

$pd = \frac{n}{2}\lambda$

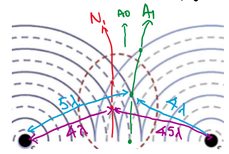


(The one w/ Zero line) p.d = 4.5λ - 4.5λ ⇒ 0 ↳ A_0

★ Antiphase

Constructive (A_1, A_2)

$p.d. = \frac{n}{2}\lambda$



(The one w/o Zero) p.d = 4.5λ - 4λ = 0.5λ → N_1

∴ N_2 = 1.5λ

N_3 = 2.5λ

N_x = x-0.5λ

(The one w/ Zero) p.d = 5λ - 4λ = 1λ → A_1

A_2 = 2λ

A_3 = 3λ

A_x = xλ

Destructive (N_0, N_1)

p.d. = nλ

Width between Antinodal/Nodal line

d : dist between sources

w : width as two lines

λ : wavelength

$w \propto \frac{\lambda}{d}$

Chickened Yeoman ©

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