(from Page-1) Continued - MJC Physics Sem-II, Date - 06.01.025

$$0 = a\sin\frac{2\pi}{\lambda}(vt) + a'\sin\frac{2\pi}{\lambda}(vt) \longrightarrow (4)$$

or, $\sin\frac{2\pi}{\lambda}(vt)(a+a') = 0$

$\because \sin\frac{2\pi}{\lambda}(vt) \neq 0$

$\therefore a + a' = 0$

or $a = -a'$

Hence equation (4) for the resultant displacement is

$$y = a\left[\sin\frac{2\pi}{\lambda}(vt-x) - a\sin\frac{2\pi}{\lambda}(vt+x)\right]$$

$$= -a\left[\sin\frac{2\pi}{t}(vt+x) - \sin\frac{2\pi}{\lambda}(vt-x)\right]$$

$$= -2a\cos\frac{2\pi}{\lambda}\left(\frac{vt+x+vt-x}{2}\right)\sin\frac{2\pi}{\lambda}\left(\frac{vt+x-vt+x}{2}\right)$$

$$= -2a\cos\frac{2\pi vt}{\lambda}\sin\frac{2\pi x}{\lambda}$$

$$\left[\because \sin A - \sin B = 2\cos\frac{A+B}{2}\cdot\sin\frac{A-B}{2}\right]$$

$$\boxed{\therefore y = -2a\sin\frac{2\pi x}{\lambda}\cos\frac{2\pi vt}{\lambda}} \longrightarrow (5)$$

This equation represents the resultant displacement or disturbance which is of the same period as the original waves but of amplitude $-2a\sin\left(\frac{2\pi x}{\lambda}\right)$

This is the equation of the resultant stationary wave.

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