Manuel Torres.

P2

$\varphi(x,t) = A\,\text{sen}(Kx - Kvt)$

vemos el punto $x = x_0$

$\Rightarrow \varphi(x_0,t) = A\,\text{sen}(Kx_0 - Kvt)$

$\Rightarrow \varphi(x_0,t) = -A\,\text{sen}(Kvt - Kx_0)$

sabemos que $Kv = \omega$

$\Rightarrow \varphi(x_0,t) = -A\,\text{sen}(\omega t - Kx_0)$

donde nos damos cuenta que éste es un mov. armónico simple con $Kv = \omega_0$ (frecuencia natural).

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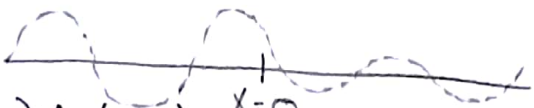
P3

$\varphi(x,t) = A\cos(Kx - \omega t)$

① **Reflejo:** $u(x,t) = \underbrace{A}_{\text{amplitud incidente}}\cos(K_1x - \omega t) + \underbrace{B}_{\text{reflejo}}\cos(-K_1x - \omega t)$, $K_1 = \dfrac{\omega}{v_1}$

② **Transmición:** $u(x,t) = \underbrace{C}_{\text{transmición}}\cos(K_2 x - \omega t)$, $K_2 = \dfrac{\omega}{v_2}$



$x=0$

① $\dfrac{\partial u_+}{\partial x}(0,t) = \dfrac{\partial u_-}{\partial x}(0,t)$

$u(x,t) = A\cos(K_1x - \omega t) + B\cos(-K_1x - \omega t) = C\cos(K_2x - \omega t) = u_+(x,t) \Big/_{x=0}$

derivando.

$\Rightarrow -K_1A\,\text{sen}(K_1x - \omega t) + BK_1\,\text{sen}(-K_1x - \omega t) = -CK_2\,\text{sen}(K_2x - \omega t) \Big/_{x=0}$

evalúo

$\Rightarrow -K_1A\,\cancel{\text{sen}(-\omega t)} + BK_1\,\cancel{\text{sen}(-\omega t)} = -CK_2\,\cancel{\text{sen}(-\omega t)}$

$\Rightarrow -K_1A + BK_1 = -CK_2 \qquad (i)$

② $u_+(0,t) = u_-(0,t)$

$A\cos(K_1x - \omega t) + B\cos(-K_1x - \omega t) = C\cos(K_2x - \omega t) \Big/_{x=0}$

$\Rightarrow A\,\cancel{\cos(-\omega t)} + B\,\cancel{\cos(-\omega t)} = C\,\cancel{\cos(-\omega t)}$

$\Rightarrow A + B = C \qquad (ii)$

$\Rightarrow -K_1A + K_1B = -K_2C = -K_2A - K_2B$

$\Rightarrow A(K_2 - K_1) = B(-K_1 - K_2)$

$\Rightarrow \dfrac{(K_2 - K_1)}{(-K_1 - K_2)} = \dfrac{B}{A}$

$\Rightarrow \left(\dfrac{K_2 - K_1}{-K_1 - K_2}\right)^2 = \left(\dfrac{B}{A}\right)^2$

$$C - A = B$$

$$\Rightarrow -K_1 A + (C - A) K_1 = -K_2 C$$

$$\Rightarrow -K_1 A + K_1 C - K_1 A = -K_2 C$$

$$\Rightarrow -2K_1 A = -K_2 C - K_1 C = C(-K_2 - K_1)$$

$$\Rightarrow \frac{-2K_1}{-K_2 - K_1} = \frac{C}{A}$$

$$\Rightarrow \left(\frac{2K_1}{K_1 + K_2}\right) = \left(\frac{C}{A}\right)^2 \quad //$$