Universidad de Chile
FCFM
FI10A-06
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Prof. Cátedra :Patricio Martens
Prof. Aux :Carlos Benavides
José Rodríguez
Pablo Vera

SOLUCIÓN AUXILIAR 8

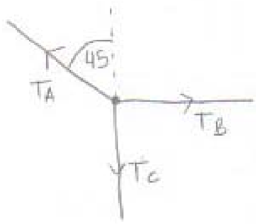
PAUTA AUXILIAR 8

$d_{AO} = 10m$

$d_{OC} = 5m$

$d_{OB} = ?$

DCL



$T_A \operatorname{sen} 45 = T_C \Rightarrow T_C = T_B$

$T_A \cos 45 = T_B$

$v = \sqrt{\frac{T}{\mu}}$

$v = \frac{d}{t} \Rightarrow t = \frac{d}{v}$

$$16 = \frac{d_{AO}}{\sqrt{\frac{T_A}{\mu}}} + \frac{d_{OB}}{\sqrt{\frac{T_B}{\mu}}} \Rightarrow 16 = \frac{10}{\sqrt{\frac{T_A}{\mu}}} + \frac{d_{OB}}{\sqrt{\cos 45}\sqrt{\frac{T_A}{\mu}}} \quad (1)$$

$$8 = \frac{d_{AO}}{\sqrt{\frac{T_A}{\mu}}} + \frac{d_{OC}}{\sqrt{\frac{T_C}{\mu}}} \Rightarrow 8 = \frac{10}{\sqrt{\frac{T_A}{\mu}}} + \frac{5}{\sqrt{\cos 45}\sqrt{\frac{T_A}{\mu}}} \quad (2)$$

de (2) $$8 = \sqrt{\frac{\mu}{T_A}}\left[10 + \frac{5}{\sqrt{\cos 45}}\right] \quad /()^2$$

$$64 = \frac{\mu}{T_A}\left[10 + \frac{5}{\sqrt{\cos 45}}\right]^2 \Rightarrow T_A = \left(10 + \frac{5}{\sqrt{\cos 45}}\right)^2 / 64$$

$$\Rightarrow v_A = \sqrt{\frac{T_A}{\mu}}$$

de (1) $$d_{OB} = \left[16 - \frac{10}{\sqrt{\frac{T_A}{\mu}}}\right]\sqrt{\cos 45}\sqrt{\frac{T_A}{\mu}}$$

P2

$f = 60\,HZ$

μ

T

- velocidad de onda $v = \sqrt{\frac{T}{\mu}}$
- $v = \lambda f \Rightarrow$ longitud de onda $\lambda = \frac{1}{60}\sqrt{\frac{T}{\mu}}$
- número de onda $K = \frac{2\pi}{\lambda} \Rightarrow K = 120\pi\sqrt{\frac{\mu}{T}}$
- función de onda $\psi(x,t) = A\,\text{sen}(KX - wt)$

  $\Rightarrow \psi(x,t) = A\,\text{sen}\left(120\pi\sqrt{\frac{\mu}{T}}X - 120\pi t\right)$
- velocidad $\dot{\psi}(x,t) = -120\pi A\cos\left(120\pi\sqrt{\frac{\mu}{T}}X - 120\pi t\right)$
- aceleración $\ddot{\psi}(x,t) = -(120\pi)^2 A\,\text{sen}\left(120\pi\sqrt{\frac{\mu}{T}}X - 120\pi t\right)$

P3

- $f_n = 375\,HZ$

  $f_{n+1} = 450\,HZ$

  $f_{n+1} - f_n = f_1 =$ frecuencia fundamental $= 75\,HZ$

  $75 \cdot n = 375 \Rightarrow n = 5$

  armónicos 5 y 6 son los que se dan!

- La cuerda vibra en el 3° armónico $\Rightarrow f = 3 \cdot 75 = 225\,HZ$

  $\psi(x,t) = A\,\text{sen}(Kx)\cos(wt)$

  $K_n = \frac{2\pi}{\lambda_n}$ $\quad v = \lambda_n f_n \Rightarrow \lambda_n = \frac{f_n}{v}$ $\quad v = \sqrt{\frac{T}{\mu}} = \sqrt{\frac{360}{4\cdot 10^{-3}}}$

  $\Rightarrow \lambda_n = \frac{225}{\sqrt{\frac{360}{4\,10^{-3}}}} \Rightarrow K_n = \frac{2\pi}{\lambda_3}$

  largo cuerda $L = n\frac{\lambda_n}{2} = 3\frac{\lambda_3}{2}$

- $\psi(x,t) = A\,\text{sen}(Kx)\cos(wt) \Rightarrow \dot{\psi}(x,t) = Aw\,\text{sen}(Kx)\,\text{sen}(wt) \Rightarrow \dot{\psi}_{max}$ ocurre cuando $\text{sen}(Kx) = 1$

  $\Rightarrow \text{sen}(Kx) = 1 \Leftrightarrow Kx = \frac{\pi}{2}$

  $\Rightarrow x = \frac{\pi}{2K}$