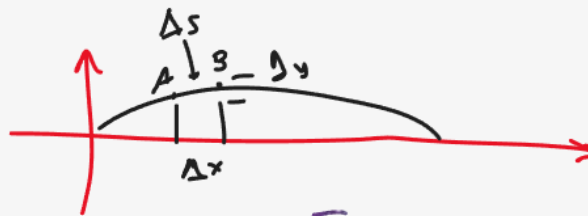
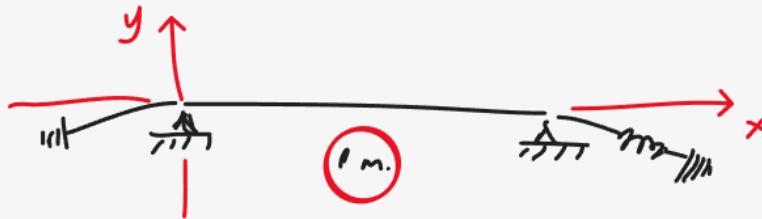


Clase 18-Nov-2021

TEMA 4 - PROBLEMA DE LA CUERDA DE GUITARRA



$$\Delta s \neq \Delta x$$

$$F = ma \quad a = \frac{\partial^2 y(x,t)}{\partial t^2}$$

$$y(x,t)$$

incógnita

ρ masa relativa

$$m = \rho \cdot \Delta s$$

$$F = \rho \cdot \Delta s \cdot \frac{\partial^2 y}{\partial t^2}$$

$$F = T_A - T_B \quad \alpha < 45^\circ$$

$$\text{Sen } \alpha \doteq \tan \alpha \doteq \frac{\Delta y}{\Delta x}$$

$$T_A = T \frac{\Delta y}{\Delta x} \quad \Delta x \rightarrow 0$$

$$T_A = T \frac{\partial y}{\partial x}$$

$$\overline{B} = T \frac{\partial y}{\partial x} + \frac{\partial^2 y}{\partial x^2} \cdot \Delta x$$

$$F = T \frac{\partial^2 y}{\partial x^2} \cdot \Delta x$$

$$T \frac{\partial^2 y}{\partial x^2} \cdot \Delta x = \rho \Delta s \cdot \frac{\partial^2 y}{\partial t^2}$$

$$\Delta x \rightarrow 0 \quad \Delta s = \Delta x$$

$$T \frac{\partial^2 y}{\partial x^2} = \rho \frac{\partial^2 y}{\partial t^2}$$

$$T > 0 \quad \rho > 0$$

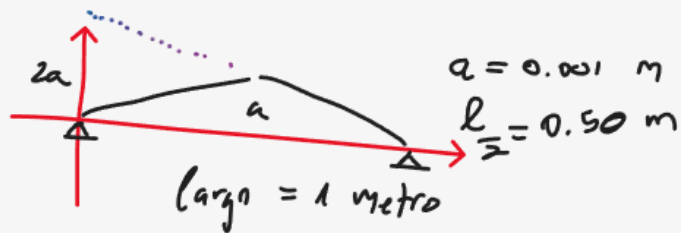
$$c^2 = \frac{T}{\rho}$$

$$c^2 \frac{\partial^2 y}{\partial x^2} = \frac{\partial^2 y}{\partial t^2}$$

$$\boxed{\frac{\partial^2 y}{\partial t^2} - c^2 \frac{\partial^2 y}{\partial x^2} = 0}$$

EDenDP de la cuerda

condiciones de la cuerda



inicial

$$y(x,t)_{t=0} = \begin{cases} \frac{a}{l/2} x & ; 0 \leq x \leq l/2 \\ 2a - \frac{a}{l/2} x & ; l/2 \leq x \leq l \end{cases}$$

frontera

$$\forall t \quad y(0,t) = 0$$

$$y(l,t) = 0$$

$$\left. \frac{\partial y(x,t)}{\partial t} \right|_{t=0} = 0$$

$$\frac{\partial^2 y}{\partial t^2} - c^2 \frac{\partial^2 y}{\partial x^2} = 0$$

$$c^2 = \frac{T}{\rho} \quad \text{material de la cuerda}$$