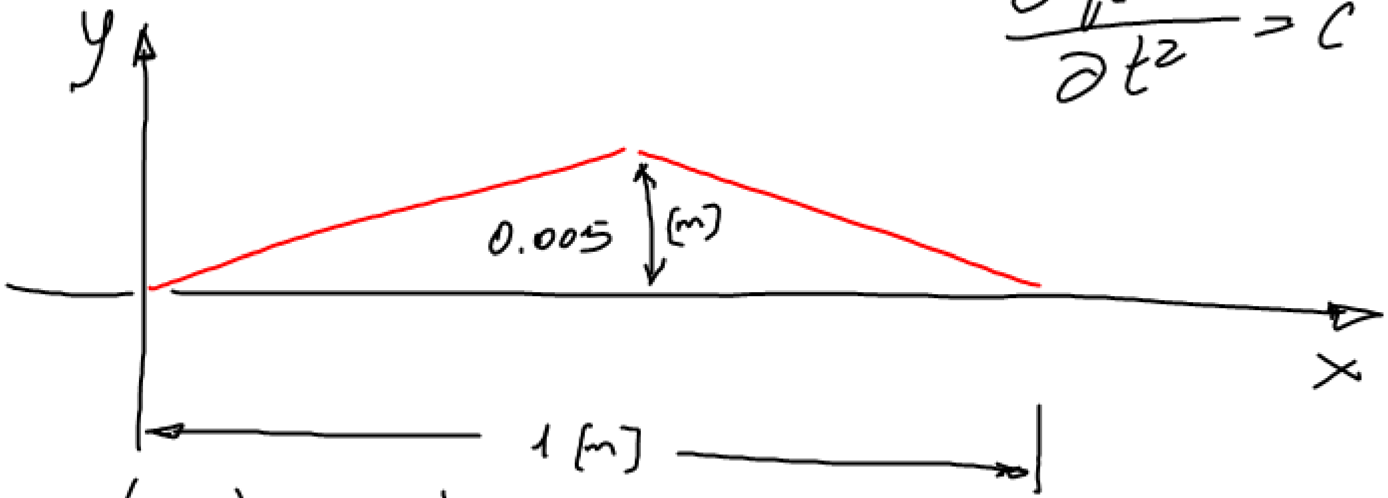
$$\frac{\partial^2 y(x,t)}{\partial t^2} = c^2 \frac{\partial^2 y(x,t)}{\partial x^2}$$



$$\left.\begin{aligned} y(0,t) &= 0 \\ y(1,t) &= 0 \end{aligned}\right\} \text{ C. Frontera. } \forall t \in \mathbb{R}^+$$

$$y(x,0) = \begin{cases} \dfrac{\frac{5}{1000}}{\left(\frac{1}{2}\right)} x & ; \ 0 \leq x \leq 1/2 \\[2ex] \dfrac{10}{1000} - \dfrac{\frac{5}{1000}}{\left(\frac{1}{2}\right)} x & ; \ 1/2 < x \leq 1 \end{cases}$$

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

$$F(x) \underset{\alpha=0}{=} C_1 x + C_2 \qquad y(x,t) = F(x)\cdot G(t)$$

$$y(0,t) = 0 \qquad F(0)\, G(t) = 0 \qquad G(t) \neq 0 \quad \forall t \in \mathbb{R}^+$$

$$F(0) = 0$$

$$C_1 \cdot (0) + C_2 = 0 \longrightarrow \boxed{C_2 = 0}$$

$$F(x) = C_1 x$$

$$y(1,t) = 0 \qquad F(1)\cdot G(t) = 0 \qquad F(1) = 0$$

$$C_1 \cdot (1) = 0 \qquad \boxed{C_1 = 0}$$

$$F(x) = 0 \quad \forall x \in \mathbb{R}$$

$$F(x) = C_1 e^{-\beta x} + C_2 e^{\beta x}$$

$\alpha > 0$

$F(0) = 0$

$F(1) = 0$

$$C_1 e^{-\beta(0)} + C_2 e^{\beta(0)} = 0$$

$$C_1 = -C_2$$

$$C_1 e^{-\beta(1)} + C_2 e^{\beta(1)} = 0$$

$$\frac{-C_2}{e^{\beta}} + C_2 e^{\beta} = 0$$

$$C_2 e^{\beta} = \frac{C_2}{e^{\beta}}$$

$$e^{2\beta} = 1$$

$$\beta = 0 \rightarrow \alpha = 0$$

pero $\beta \neq 0$

$C_1 = 0 \quad C_2 = 0$

$$F(x) = C_1 \cos(\beta x) + C_2 \operatorname{sen}(\beta x)$$

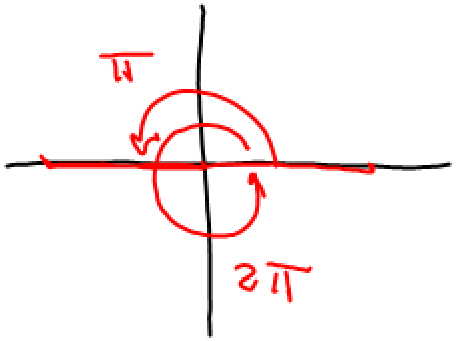
$$F(0) = 0 \qquad C_1 \cos(\beta(0)) + C_2 \operatorname{sen}(\beta(0)) = 0$$

$$C_1 + C_2(0) = 0 \qquad \boxed{C_1 = 0}$$

$$F(1) = 0 \qquad C_2 \operatorname{sen}(\beta) = 0 \qquad C_2 \neq 0$$

$$\operatorname{sen}(\beta) = 0 \qquad \boxed{\beta = n\pi}$$

$$\forall n \in N$$



$$\alpha = -\beta^2$$

$$\alpha = -n^2\pi^2$$

Sol. Gral $\varphi(x,t) = \operatorname{sen}(n\pi x)\left(C_1 \cos(n\pi c t) + C_2 \operatorname{sen}(n\pi c t)\right)$

$$y(x,t) = \sum_{n=1}^{\infty} \operatorname{sen}(n\pi x)\left(b_n \cos(n\pi c t) + a_n \operatorname{sen}(n\pi c t)\right)$$

$$y(x,t)\Big|_{t=0} = \sum_{n=1}^{\infty} \operatorname{sen}(n\pi x)\left(b_n + a_n(0)\right)$$

$$= \sum_{n=1}^{\infty} b_n \operatorname{sen}(n\pi x) = \begin{cases} \dfrac{0.030}{1}x \;; & 0 \leq x \leq 0.5 \\[2ex] 0.030 - \dfrac{0.030}{1}x \;; & 0.5 < x \leq 1 \end{cases}$$