

PAUTA AUXILIAR 15

P1) a) Intentemos resolver (P) mediante el MSV

$$v(x,t) = X(x) \cdot T(t)$$

$$v_t = XT'$$

$$v_{xx} = X''T$$

$$\Rightarrow XT' = X''T + \sin(x)$$

$$\Leftrightarrow \frac{T'}{T} = \frac{X''}{X} + \frac{\sin(x)}{XT}$$

¡no se pueden separar!

∴ el MSV Falla

b) $v(x,t) = \bar{v}(x,t) + w(x)$

$$\Rightarrow v_t = \bar{v}_t$$

$$v_{xx} = \bar{v}_{xx} + w''(x)$$

como $v_t = v_{xx} + \sin(x)$

$$\bar{v}_t = \bar{v}_{xx} + w''(x) + \sin(x)$$

pero queremos que $\bar{v}_t = \bar{v}_{xx} \Leftrightarrow w''(x) + \sin(x) = 0$

$$w''(x) = -\sin(x) \quad / \int dx$$

$$w'(x) = \cos(x) + K_1 \quad / \int dx$$

$$w(x) = \sin(x) + K_1 x + K_2$$

pero $v(0,t) = 0 = \bar{v}(0,t) + w(0) \Rightarrow w(0) = 0$

$v(\pi,t) = 0 = \bar{v}(\pi,t) + w(\pi) \Rightarrow w(\pi) = 0$

$$w(0) = K_2 = 0 \Rightarrow w(x) = \sin(x) + K_1 x$$

$$w(\pi) = \pi K_1 = 0 \Rightarrow K_1 = 0$$

$$\therefore w(x) = \sin(x) //$$

Falta ver cuánto vale $f(x)$

$$v(x,0) = \bar{v}(x,0) - w(x) = f(x) \Rightarrow f(x) = -\sin(x) //$$