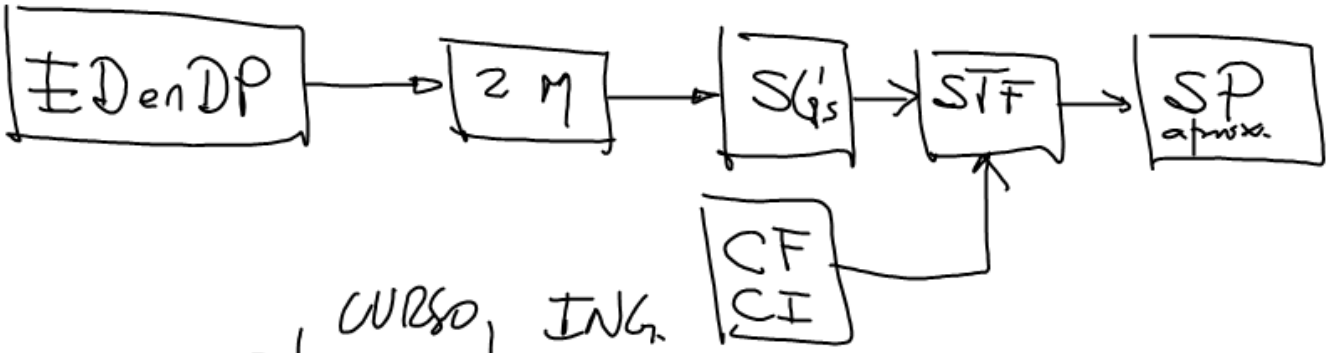
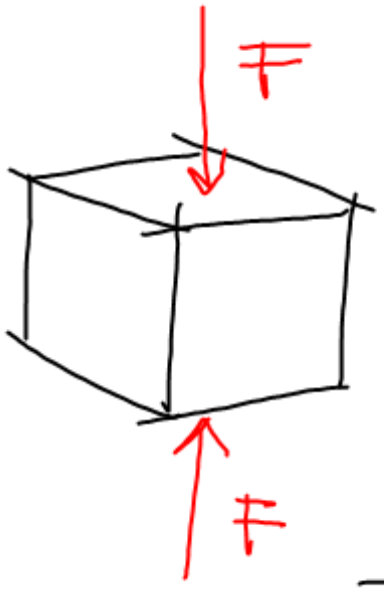
Cap. V. Ecuaciones Diferenciales en Derivadas Parciales & la Serie Trigonométrica de FOURIER

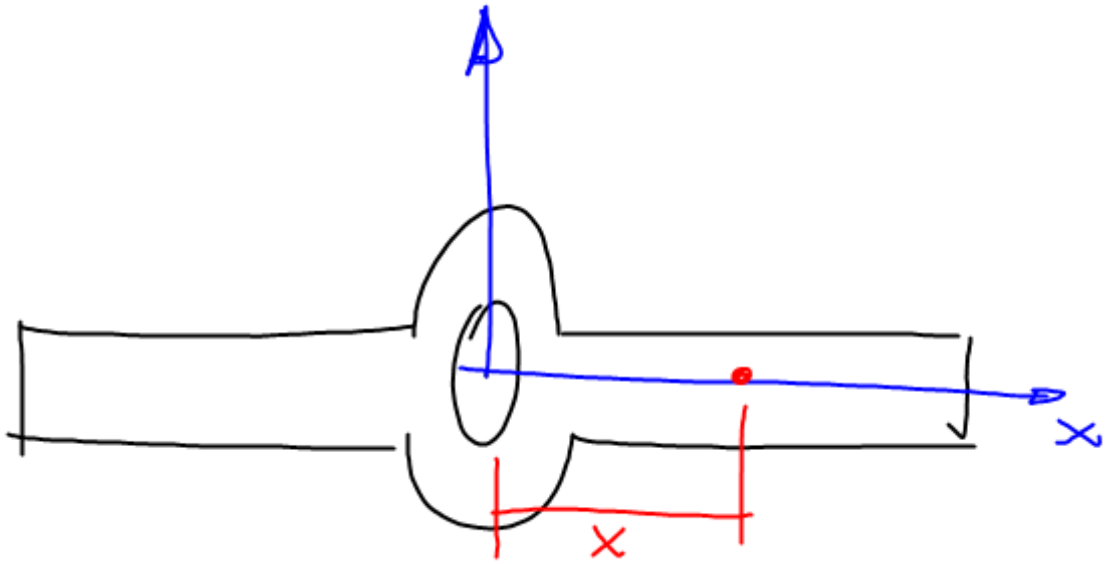


	CURSO	ING.
EDO	80%	20%
EDeDP	20%	80%



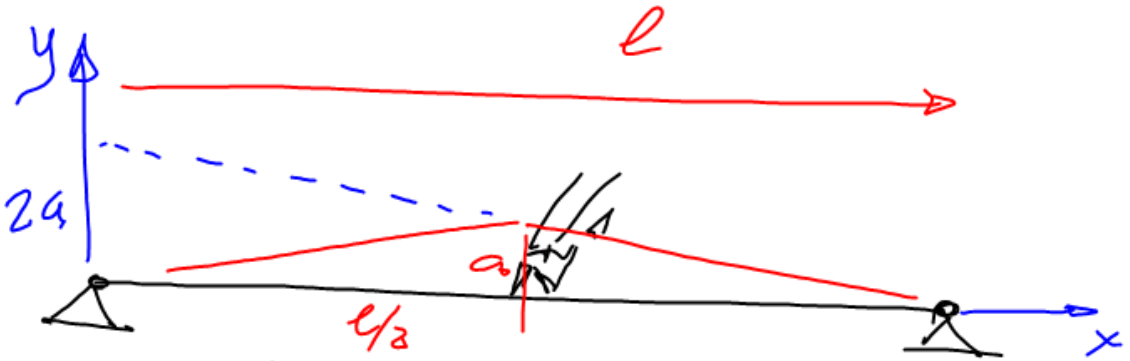
$$\frac{\partial^2 z}{\partial x^2} + a^2 \frac{\partial^2 z}{\partial y^2} = 0$$

$$z(x, y)$$



$T(x,t)$

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



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

$$\left.\begin{aligned} y(0,t) &= 0 \\ y(\ell,t) &= 0 \end{aligned}\right\} \text{ cond. frontera}$$

$$y(x,0) \Rightarrow f(x) = \begin{cases} \frac{a}{\ell/2}x & ; 0 \le x < \ell/2 \\ -\frac{a}{\ell/2}x + 2a & ; \ell/2 \le x \le \ell \end{cases}$$

$$y'(x,0) = 0$$

condiciones iniciales.

$y(x,t)$

$$\frac{\partial^2 y}{\partial t^2} - 5\frac{\partial^2 y}{\partial x \partial t} + 6\frac{\partial^2 y}{\partial x^2} = 0$$

~~EDenDP~~(z) L cc H. (ultra simple / super simple).

- LINEALES
  - CUASILINEALES.
- NO LINEALES

$$\frac{\partial^2 y}{\partial t^2} - 5\frac{\partial^2 y}{\partial x \partial t} + 6\frac{\partial^2 y}{\partial x^2} = 0$$

$y(x,t) \Rightarrow y(u) \longrightarrow u = x + mt$

$$\frac{\partial y}{\partial t} \Rightarrow \frac{dy}{du} \cdot \frac{\partial u}{\partial t} \Rightarrow y' \cdot m \rightarrow \frac{\partial^2 y}{\partial t^2} \Rightarrow m y'' \cdot m \Rightarrow m^2 y''$$

$$\frac{\partial^2 y}{\partial x \partial t} \Rightarrow m y'' \cdot (1) \Rightarrow m y''$$

$$\frac{\partial y}{\partial x} \Rightarrow \frac{dy}{du} \cdot \frac{\partial u}{\partial x} \Rightarrow y' \cdot (1) \rightarrow \frac{\partial^2 y}{\partial x^2} \Rightarrow y''$$

$$m^2 y'' - 5 m y'' + 6 y'' = 0$$

$$(m^2 - 5m + 6)\frac{d^2 y}{d^2} = 0$$

$$\frac{d^2 y}{du^2} = 0 \Rightarrow \frac{dy}{du} = k_1 \Rightarrow y = k_1 u + k_2 \quad \text{trivial.}$$

$$m^2 - 5m + 6 = 0 \quad (m-2)(m-3) = 0 \quad m_1 = 2, \; m_2 = 3$$

$$y(x,t) \Rightarrow y_1(x+2t) + y_2(x+3t)$$

$$\frac{\partial^2 y}{\partial t^2} - 5\frac{\partial^2 y}{\partial t \partial x} + 6\frac{\partial^2 y}{\partial x^2} = 0$$

$$y_p = 5\cos(x+2t) + 6\tan(x+3t)$$

$$y_p = 8e^{(x+2t)} + 6\cosh(x+3t)$$

$$y_p = (x+2t)^4 + (x+3t)^6$$

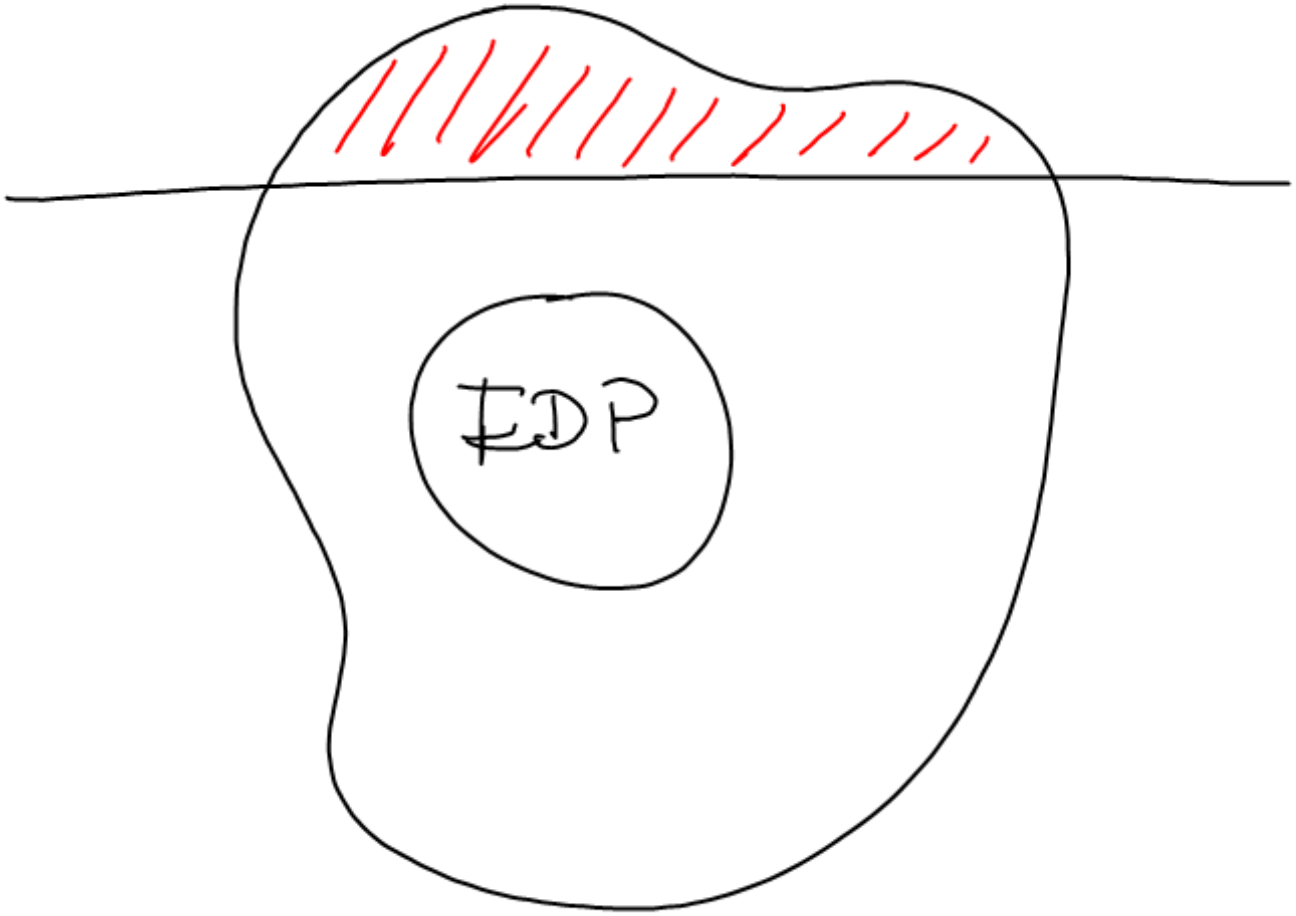
$$y(x,t) = y_1(x+2t) + y_2(x+3t)$$

$$z(x,y)$$

$$\frac{\partial^2 z}{\partial x^2} + 4\frac{\partial^2 z}{\partial x \partial y} + 4\frac{\partial^2 z}{\partial y^2} = 0$$

$$z_g(x,y) = z_1(y-2x) + x z_1(y-2x)$$

$$z(x,y) = z_1(y-2x) + y z_1(y-2x)$$


EDP