$$x' = a_{11}x + a_{12}y + b_1$$

$$y' = a_{21}x + a_{22}y + b_2$$

$$\begin{bmatrix} x' \\ y' \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} + \begin{bmatrix} b_1 \\ b_2 \end{bmatrix} \qquad \bar{x}(0) = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix}$$

$$\frac{d}{dt}\bar{x} = A\bar{x} + \bar{b}(t)$$

$$\bar{x} = e^{At}\bar{x}(0) + \int_0^t e^{A(t-\tau)}\bar{b}(\tau)\,d\tau.$$

# TEMA 4.- (Una muy breve introducción) a las Ecuaciones Diferenciales en Derivadas Parciales

$$F\left(x, y, z(x,y), \frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, \frac{\partial^2 z}{\partial x^2}, \ldots\ldots\right) = 0$$

$$G\left(x, y, t, z(x,y,t), \frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, \frac{\partial z}{\partial t}, \ldots\right) = 0$$

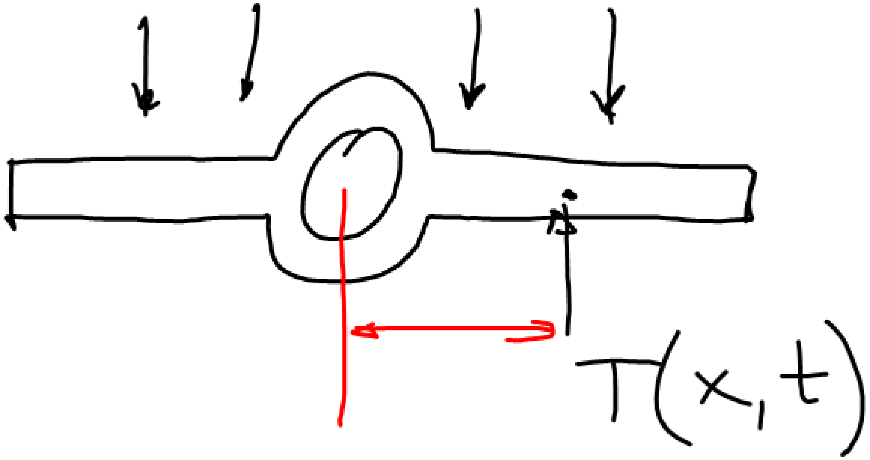
orden EDenDP $\longrightarrow$ orden de la derivada de mayor orden.

EDO
- Lineales
- No Lineales

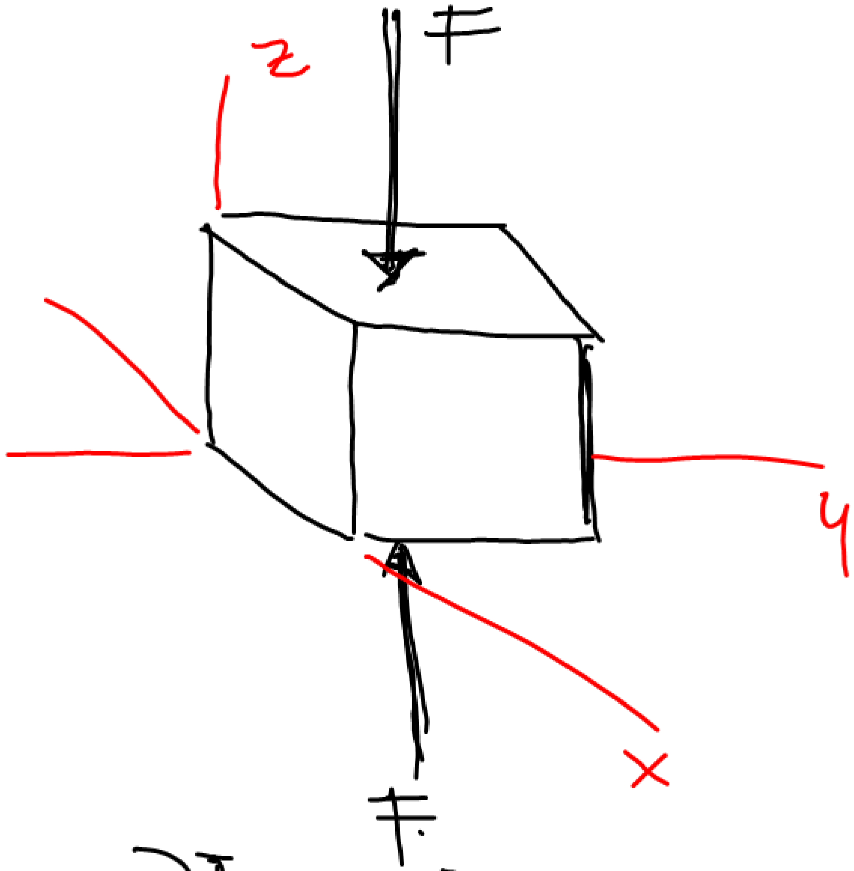
- SG - única
- SP - $\infty$
  - C.I.
  - C.F.
- SS - #

EDenDP
- Lineales
- Cuasilineales.
- No Lineales

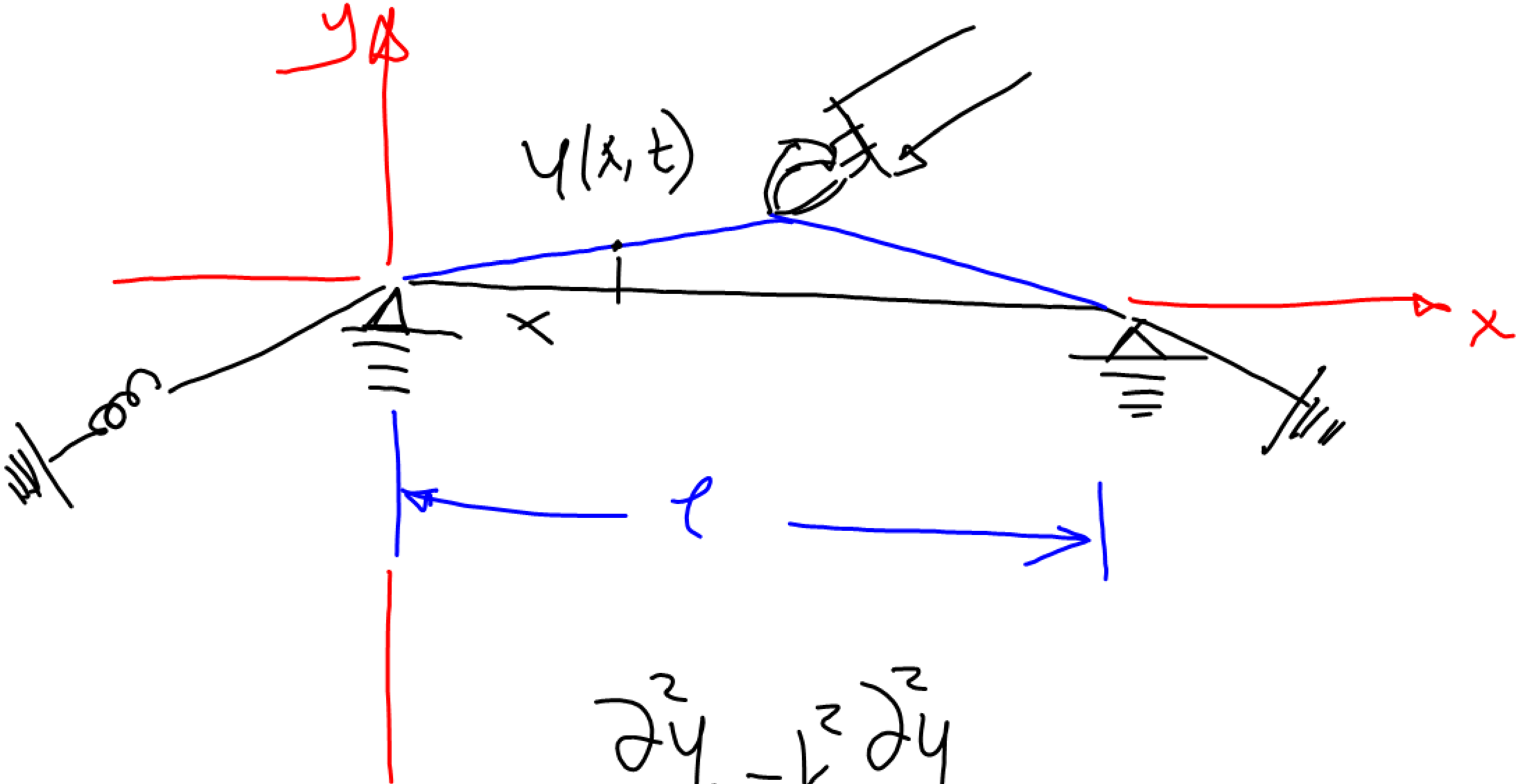
- SG =
  - única
  - no única
- SP = $\infty$
- SS = #
  - X




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




$$a_1 \frac{\partial z}{\partial x} + a_2 \frac{\partial z}{\partial y} = 0 \qquad z(x, y)$$




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

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

EDenDP (2) H.

$$z(x,y) = F(y+mx) \qquad F(u) \quad u = y+mx$$

$$\frac{\partial z}{\partial x} = \frac{dF}{du}\cdot\frac{du}{dx} \Rightarrow \frac{\partial z}{\partial x} = mF'$$

$$\frac{\partial z}{\partial y} = \frac{dF}{du}\cdot\frac{du}{dy} \Rightarrow \frac{\partial z}{\partial y} = F'$$

$$\frac{\partial^2 z}{\partial x^2} = \frac{dF'}{du}\cdot\frac{du}{dx} \Rightarrow \frac{\partial^2 z}{\partial x^2} = m^2F''$$

$$\frac{\partial^2 z}{\partial x \partial y} = \frac{dF'}{du}\cdot\frac{du}{dy} \Rightarrow \frac{\partial^2 z}{\partial x \partial y} = mF''$$

$$\frac{\partial^2 z}{\partial y^2} = \frac{dF'}{du}\cdot\frac{du}{dy} \Rightarrow \frac{\partial^2 z}{\partial y^2} = F''$$

$$(m^2F'') + 5(mF'') + 6(F'') = 0$$

$$(m^2 + 5m + 6)F'' = 0 \quad \begin{cases} F'' = 0 \\ F' = k_1(y+mx) \\ F = \frac{k_1}{2}(y+mx)^2 + k_2(y+mx) \end{cases}$$

Ecuación característica

$$m^2 + 5m + 6 = 0 \qquad m_1 = -2$$

$$(m+2)(m+3) = 0 \qquad m_2 = -3$$

Solución inútil.

$$z(x,y) = F(y+mx)$$

$$\boxed{z_g(x,y) = F_1(y-2x) + F_2(y-3x)}$$

$$z_p(x,y) = 5e^{(y-2x)} + 4\cos(y-3x)$$

$$z_p(x,y) = 2\sqrt{y-2x} + 8(y-3x)^2$$

MÉTODO SERIE TRIGONOMÉTRICA FOURIER

# HULE