$$\frac{d}{dt}\bar{x} = A\bar{x} \qquad \bar{x}(0)$$

$$\mathcal{L}\left\{\frac{d}{dt}\bar{x}\right\} = \mathcal{L}\left\{A\bar{x}\right\}$$

$$s\mathcal{L}\{\bar{x}\} - \bar{x}(0) = A\mathcal{L}\{\bar{x}\}$$

$$s\mathcal{L}\{\bar{x}\} - A\mathcal{L}\{\bar{x}\} = \bar{x}(0)$$

$$(sI - A)\mathcal{L}\{\bar{x}\} = \bar{x}(0)$$

$$\mathcal{L}\{\bar{x}\} = (sI-A)^{-1}\bar{x}(0)$$

$$\bar{x} = \mathcal{L}^{-1}\left\{(sI-A)^{-1}\right\}\bar{x}(0)$$

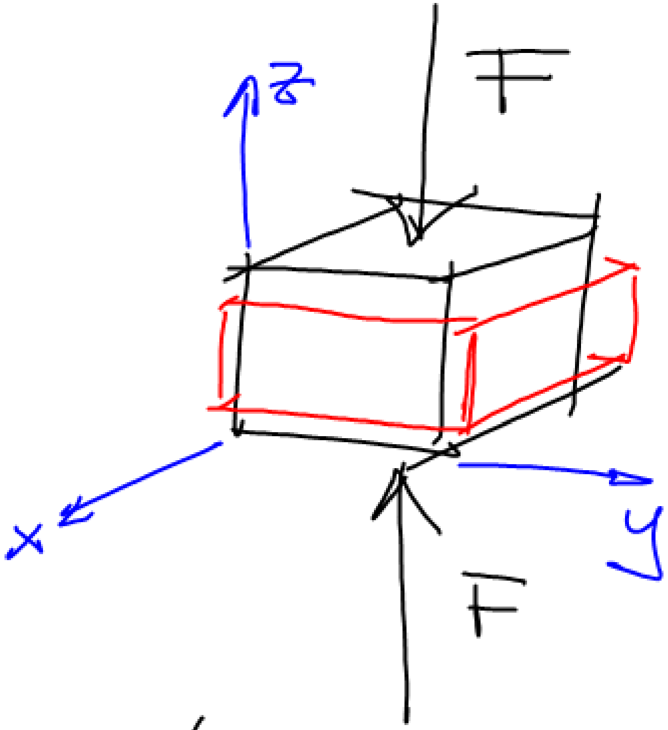
$$\bar{x} = e^{At}\bar{x}(0)$$

$$\boxed{e^{At} = \mathcal{L}^{-1}\left\{(sI-A)^{-1}\right\}}$$

Capítulo V.- La Ecuación Diferencial en Derivadas Parciales

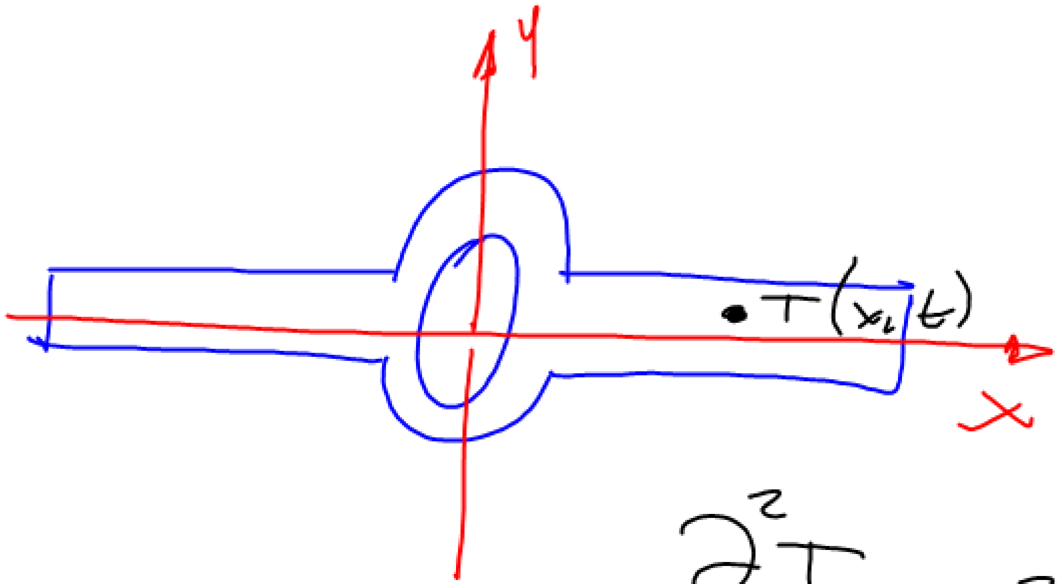
"Una muy breve introducción a las EDenDP y la Serie Trigonométrica de Fourier"

	EDO	EDenDP
Tem.	80%	20%
Vida Real	20%	80%



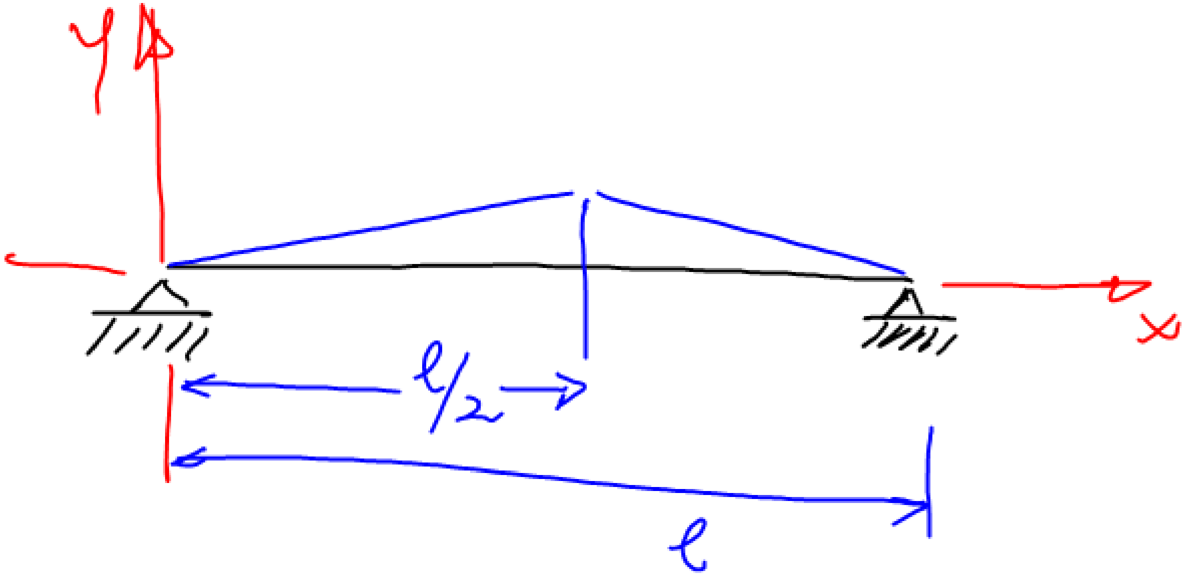
$$\frac{\partial^2 z}{\partial x^2} + k\frac{\partial^2 z}{\partial y^2} = z$$

$z(x, y)$



$$\frac{\partial^2 T}{\partial x^2} - k^2 \frac{\partial^2 T}{\partial t^2} = 0$$

$T(x, t)$



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

$$y(x,t)$$

$z(x, y)$

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

orden $\longrightarrow$

Linealidad $\begin{cases} \text{Lineales} \\ \text{Cuasilineales.} \\ \text{No lineales} \end{cases}$

La solución general no es única.

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

$m \in \mathbb{R}$

Hipótesis

$$z(mx+y) \rightarrow z(u) \rightarrow u = mx+y$$

$$\frac{\partial z}{\partial x} = \frac{dz}{du} \cdot \frac{\partial u}{\partial x} \Rightarrow z' \cdot (m) \Rightarrow m z'$$

$$\frac{\partial z}{\partial y} = \frac{dz}{du} \cdot \frac{\partial u}{\partial y} \Rightarrow z' \cdot (1) \Rightarrow z'$$

$$\frac{\partial^2 z}{\partial x^2} = m z'' \cdot (m) \Rightarrow m^2 z''$$

$$\frac{\partial^2 z}{\partial y^2} \Rightarrow z'' \cdot (1) \Rightarrow z''$$

$$\frac{\partial^2 z}{\partial x \partial y} = z'' \cdot (m) \Rightarrow m z''$$

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

$$(m^2 - 5m + 6) z'' = 0$$

$$z'' = 0 \quad z' = k_1 \quad z = k_1 (u) + k_2$$

$$\boxed{z = k_1 m x + k_1 y + k_2}$$ Trivial ó inútil.

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

$$(m-3)(m-2) = 0 \qquad m_1 = 3$$
$$m_2 = 2$$

$$Z(3x+y) \qquad Z(2x+y)$$

$$e^{(3x+y)} \qquad \cos(2x+y)$$

$$(3x+y)^4 \qquad \sqrt{2x+y}$$

$$Z_g = F_1(3x+y) + F_2(2x+y)$$

$$F\left(x, y, f, \frac{\partial f}{\partial x}, \ldots\right) = 0 \quad \text{orden} = 3$$

$$f(x,y) = F_1(x,y) + F_2(x,y) + F_3(x,y)$$

Las soluciones particulares que se desprenden de las generales utilizando la STF serán siempre aproximadas (pero muy precisas)

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

$$z(mx+y) \longrightarrow m_1 = m_2 = 2$$

$$z(2x+y)$$

$$z = F_1(2x+y) + F_2(2x+y)\cdot x$$

$$z = F_1(2x+y) + F_2(2x+y)\cdot y$$