PROPIEDADES DE LA MATRIZ EXPONENCIAL

$A \quad n \times n$

e^{At} $\qquad$ e^{at}

$$\frac{d}{dt}\left[e^{At}\right] = A \times \left[e^{At}\right] \qquad \frac{d}{dt}e^{at} = ae^{at}$$

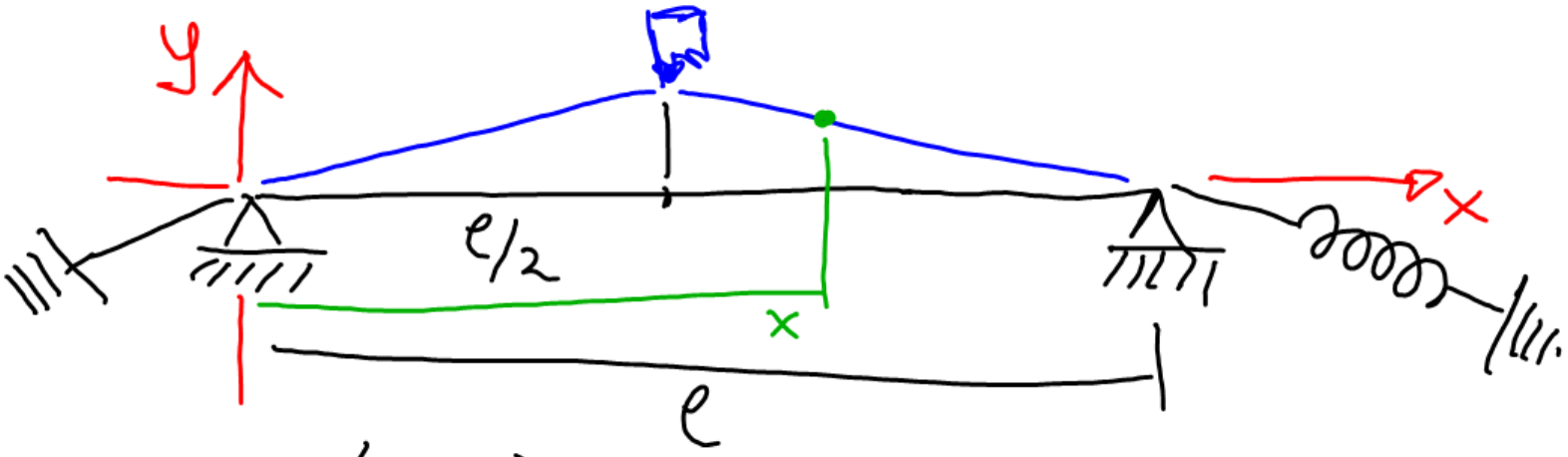
$$\left[e^{At}\right]_{t=0} = I.$$

$$\left[e^{At}\right] \times \left[e^{At}\right]^{-1} = I.$$

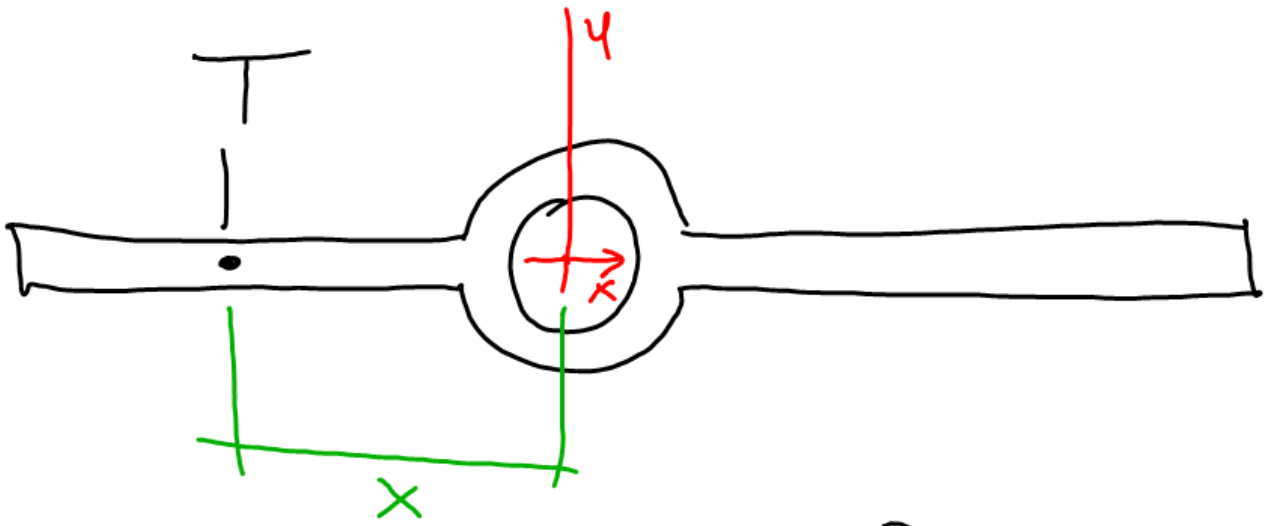
$$\left[e^{At}\right] \times \left[e^{A(-t)}\right] = I.$$

CAP 4 – ECUACIONES DIF. EN DER. PARC.

EJERCICIO FINAL



$y(x,t)$ $\dfrac{\partial y}{\partial x}$ $\dfrac{\partial^2 y}{\partial x^2}$ $\dfrac{\partial y}{\partial t}$ $\dfrac{\partial^2 y}{\partial t^2}$



$T(x,t)$ $\frac{\partial T}{\partial x}$ $\frac{\partial^2 T}{\partial x^2}$ $\frac{\partial T}{\partial t}$ $\frac{\partial^2 T}{\partial t^2}$

Definición:

Una EDenDP es aquella cuya incógnita es dependiente de dos o más var. indep.

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

$F(x,y)$

$$\frac{\partial^2 z}{\partial x^2} + a_1\frac{\partial^2 z}{\partial x \partial y} + a_2\frac{\partial^2 z}{\partial y^2} = 0 \qquad z(x,y)$$

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

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

Hipótesis

$$z = f(x + my) \qquad f(u) \qquad u = x + my$$

$$\frac{\partial z}{\partial x} = f' \cdot \frac{\partial u}{\partial x} \Rightarrow f' \cdot (1) \Rightarrow f'$$

$$\frac{\partial z}{\partial y} = f' \cdot \frac{\partial u}{\partial y} \Rightarrow f' \cdot m$$

$$\frac{\partial^2 z}{\partial x^2} = f'' \frac{\partial u}{\partial x} \Rightarrow f'' \cdot (1) \Rightarrow f''$$

$$\frac{\partial^2 z}{\partial y^2} = mf'' \cdot \frac{\partial u}{\partial y} \Rightarrow mf'' \cdot m \Rightarrow m^2 f''$$

$$\frac{\partial^2 z}{\partial x \partial y} = mf'' \cdot \frac{\partial u}{\partial x} \Rightarrow mf'' \cdot 1 \Rightarrow mf''$$

$$m^2 f'' + 5mf'' + 6f'' = 0$$

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

$$\int f''(u) \Rightarrow f'(u) + C_1$$

$$\int f'(u) = f(u) + C_1 u + C_2$$

$$z = f(x+my) + C_1(x+my) + C_2 \quad \text{trivial.}$$

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

$$(m+2)(m+3) = 0 \rightarrow \begin{matrix} m_1 = -2 \\ m_2 = -3 \end{matrix}$$

$$z = f(x-2y) \qquad z = f(x-3y)$$

$$z_g = f_1(x-2y) + f_2(x-3y)$$

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

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