Dada $e^{At} \longrightarrow A$

$$e^{At} \qquad \frac{d}{dt} e^{At} = A e^{At}$$

$$A e^{At} = \frac{d}{dt} e^{At}$$

$$A = \left[A e^{At}\right]_{t=0} = \left[\frac{d}{dt} e^{At}\right]_{t=0}$$

$$\left[e^{At}\right]^{-1} A e^{At} = \left[e^{At}\right]^{-1} \cdot \left[\frac{d}{dt} e^{At}\right]$$

$$A = \left[e^{A(-t)}\right] \cdot \left[\frac{d}{dt} e^{At}\right]$$

$$e^{At} = \begin{bmatrix} \cos(t) & \operatorname{sen}(t) \\ -\operatorname{sen}(t) & \cos(t) \end{bmatrix}$$

$$\frac{d}{dt} e^{At} = \begin{bmatrix} -\operatorname{sen}(t) & \cos(t) \\ -\cos(t) & -\operatorname{sen}(t) \end{bmatrix}$$

$$A = \left[\frac{d}{dt} e^{At} \right]_{t=0} = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$

Ecuación Diferencial no-lineal $\left\{ \begin{array}{l} \text{Sol. gral.} \\ \text{Sol. part} \\ \text{Sol. singular} \end{array} \right.$

Solución general no hom $\longrightarrow$ EDO(2) LNH

Lineal 1er. orden CV no hom.

$$\frac{dy}{dx} + p(x)y = q(x)$$

Lineal 2-3 orden CC No hom PV.

con cond. $\rightarrow$ Sol. part $\rightarrow$ plot.

Sistema $\left\{ \begin{array}{l} \text{hom} \\ \text{no hom} \end{array} \right.$

$$e^{2x} \longrightarrow e\wedge 2x$$

$$\frac{d^2y}{dt^2} + 5\frac{dy}{dt} - 3y = 5e^{-t}$$

$$y = y_1$$

$$\frac{dy}{dt} = \frac{dy_1}{dt} = y_2$$

$$\frac{d^2y}{dt^2} = \frac{dy_2}{dt}$$

$$\frac{dy_2}{dt} + 5y_2 - 3y_1 = 5e^{-t}$$

$$\begin{cases} \dfrac{dy_1}{dt} = y_2 \\ \dfrac{dy_2}{dt} = 3y_1 - 5y_2 + 5e^{-t} \end{cases} \qquad \bar{y}(0) = \begin{bmatrix} k_1 \\ k_2 \end{bmatrix}$$

$$\frac{d}{dt}\begin{bmatrix} y_1 \\ y_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ 3 & -5 \end{bmatrix}\begin{bmatrix} y_1 \\ y_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 5e^{-t} \end{bmatrix}$$

$$\bar{y} = e^{At}\,\bar{y}(0) + \int_0^t e^{A(t-z)}\,5(z)\,dz$$

SG

$$y(x) = c_1 e^{-x} + c_2 e^{-x}\cos(2x) + c_3 e^{-x}\operatorname{sen}(2x) + 5e^{x}$$

$$(m+1)(m-(-1+2i))(m-(-1-2i)) = 0$$

$$y_{ne_r} = 5e^{x}$$

$$(m+1)((m+1)^2-(2i)^2) = 0$$