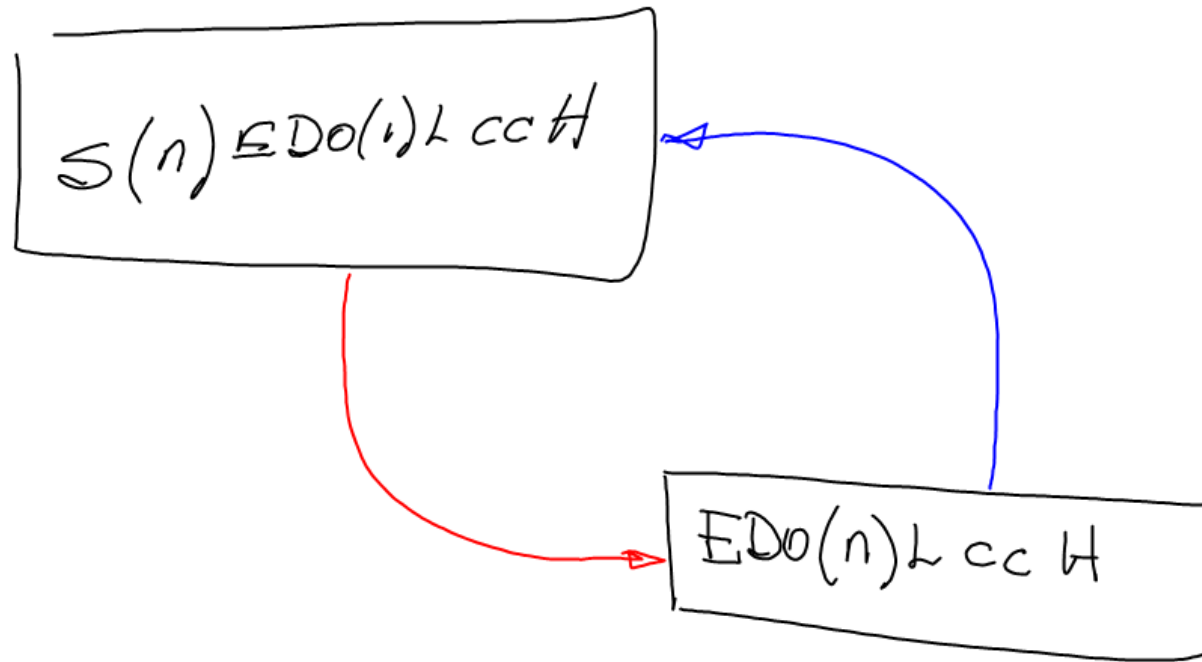


Sistemi di Ec's Dif's Lineari



$$\frac{d^3 y}{dt^3} - 3 \frac{d^2 y}{dt^2} + 4 \frac{dy}{dt} - 6y = 0$$

$$y(0) = 4$$

$$y'(0) = -3$$

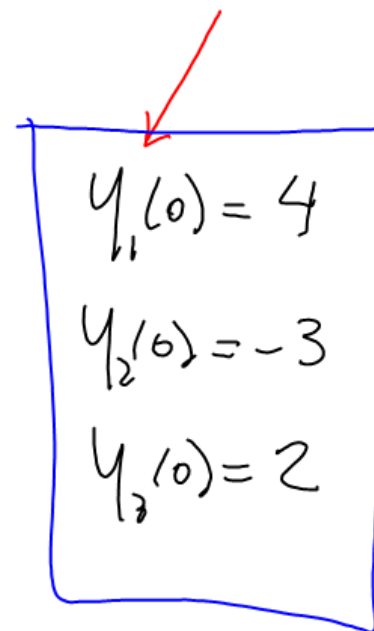
$$y''(0) = 2$$

$$y(t) \Rightarrow y_1(t)$$

$$\frac{dy}{dt} \Rightarrow \frac{dy_1(t)}{dt} = y_2(t)$$

$$\frac{d^2 y}{dt^2} \Rightarrow \frac{dy_2(t)}{dt} = y_3(t)$$

$$\frac{d^3 y}{dt^3} \Rightarrow \frac{dy_3(t)}{dt}$$



$$\begin{aligned} y_1(0) &= 4 \\ y_2(0) &= -3 \\ y_3(0) &= 2 \end{aligned}$$

$$\frac{d^3 y}{dt^3} - 3 \frac{d^2 y}{dt^2} + 4 \frac{dy}{dt} - 6y = 0$$

$$\frac{dy_3}{dt} - 3y_3 + 4y_2 - 6y_1 = 0$$

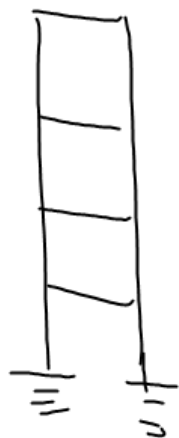
$$\frac{dy_1}{dt} = y_2$$

$$\frac{dy_2}{dt} = y_3$$

$$\frac{dy_3}{dt} = 6y_1 - 4y_2 + 3y_3$$

$$\frac{d}{dt} \begin{bmatrix} y_1(t) \\ y_2(t) \\ y_3(t) \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 6 & -4 & 3 \end{bmatrix} \begin{bmatrix} y_1(t) \\ y_2(t) \\ y_3(t) \end{bmatrix} \quad \bar{y}(0) = \begin{bmatrix} 4 \\ -3 \\ 2 \end{bmatrix}$$

$$\frac{d}{dt} \bar{y}(t) = A \bar{y}(t)$$



$$\bar{y}(t) = e^{At} \cdot \bar{y}(0)$$

Escalar

$$e^{at} e^{a(0)} = 1$$

$$\frac{d}{dt} e^{at} = a e^{at}$$

$$e^{at} \cdot \frac{1}{e^{at}} = e^{at} \cdot e^{-at} \Rightarrow 1$$

$$e^{At} \rightarrow A$$

$A^{n \times n}$ Matrices

$$\begin{bmatrix} e^{At} \end{bmatrix}_{n \times n} \begin{bmatrix} e^{At} \end{bmatrix}_{t=0} = \underline{I}_{n \times n}$$

$$\frac{d}{dt} \begin{bmatrix} e^{At} \end{bmatrix} = A \cdot \begin{bmatrix} e^{At} \end{bmatrix}$$

$$\begin{bmatrix} e^{At} \end{bmatrix} \cdot \begin{bmatrix} e^{At} \end{bmatrix}^{-1} = \begin{bmatrix} e^{At} \end{bmatrix} \cdot \begin{bmatrix} e^{A(-t)} \end{bmatrix} = \underline{I}$$