$$a_0 \frac{d^2y}{dx^2} + a_1 \frac{dy}{dx} + a_2 y = Q(x). \quad EDO(2)L\ NH\ cc.$$

Resolver la $EDO(2)Lcc\ H_A$.

$$\frac{d^2y}{dx^2} + \frac{a_1}{a_0}\frac{dy}{dx} + \frac{a_2}{a_0} y = 0$$

$$(D-m_1)(D-m_2)y = 0$$

$$y = C_1 e^{m_1 x} + C_2 e^{m_2 x}$$

MCI — NH.

$$Q(x) \longrightarrow (D-a)_A.$$

$(D-a)$	$Q(x)$
$(D-m_1)$	e^{m_1x}
$(D-m_1)^2$	xe^{m_1x}
$(D-m_1)^{n+1}$	$x^n e^{m_1x}$
D	1
D^2	x
D^{n+1}	x^n
$(D^2-2aD+(a^2+b^2))$	$e^{ax}\cos(bx)$ $e^{ax}\operatorname{sen}(bx)$
D^2+b^2	$\cos(bx)$ $\operatorname{sen}(bx)$
$(D^2+b^2)^{n+1}$	$x^n\cos(bx)$ $x^n\operatorname{sen}(bx)$
$(D^2-2aD+(a^2+b^2))^{n+1}$	$x^n e^{ax}\cos(bx)$ $x^n e^{ax}\operatorname{sen}(bx)$

$$(m-a+bi)(m-a-bi)=0$$

$$((m-a)+bi)((m-a)-bi)=0$$

$$(m-a)^2-(bi)^2=0$$

$$(m^2-2am+a^2+b^2)=0$$

$$(D^2-2aD+(a^2+b^2))=0$$

$$e^{ax}_{a\in\mathbb{R}} \quad x^n_{n\in\mathbb{E}^{\oplus}} \quad \left|\begin{matrix}\cos(bx)\\ \operatorname{sen}(bx)\\ b\in\mathbb{R}^{\oplus}\end{matrix}\right.$$

cualquier combinación tiene amiquilador.

$$Q(x)$$

$$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = \underbrace{e^{-2x} + xe^{-2x}}_{(D+2)^2} + \cos(4x)$$

$$(D^2+16)$$

$$(D-3)(D-2)y = 0$$

$$(D-3)(D-2)(D+2)^2_A(D^2+16)_A = 0$$

MÉTODO DE PARÁMETROS VARIABLES

$$y_{g/NH} = y_{g/H_n} + y_{p/Q.}$$

$$y_{g/H} = C_1 y_1 + C_2 y_2 + \ldots + C_n y_n$$

$$y_{g/NH} = A(x) y_1 + B(x) y_2 + \ldots + D(x) y_n$$

EJEMPLO

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \longrightarrow (D-1)^2$$

$$(D^2 - 2D + 1)y = 0$$

$$(D-1)^2 y = 0 \longrightarrow (D-1)^2 (D-1)^2 y = 0$$

$$\underline{y = c_1 e^x + c_2 x e^x} \qquad (D-1)^4 y = 0$$

$$y = A(x)e^x + B(x)xe^x \longrightarrow SG(NH).$$

$$\frac{dy}{dx} = A(x)e^x + B(x)\left(xe^x + e^x\right) + \underbrace{A'(x)e^x + B'(x)xe^x}_{=0}$$

$$\frac{dy}{dx} = \left(A(x) + B(x)\right)e^x + B(x)xe^x + (0)$$

$$\frac{d^2y}{dx^2} = \left(A(x)+B(x)\right)e^x + B(x)\left(xe^x + e^x\right) + \underbrace{\left(A'(x)+B'(x)\right)e^x + B'(x)\left(xe^x\right)}_{Q(x)}$$

SISTEMA ALGEBRAICO

$$\boxed{\begin{aligned} &A'(x)e^x + B'(x)xe^x = 0 \\ &\left(A'(x)+B'(x)\right)e^x + B'(x)\left(xe^x + e^x\right) = xe^x \end{aligned}}$$

$$A'(x) \qquad B'(x)$$

$$A(x) \qquad B(x)$$

$$(D^3+27)\,y(x)=5e^{3x}+2x$$

$$m^3+27=0$$

$$(m+3)(m^2-3m+9)=0$$

$$(D+3)(D^2-3D+9)\,(D-3)_A\,(D^2)_A\,y(x)=0$$

$$y(x)=\underbrace{C_1e^{-3x}+C_2e^{\frac{3}{2}x}\cos\left(\frac{3\sqrt{3}}{2}x\right)+C_3e^{\frac{3}{2}x}\operatorname{sen}\left(\frac{3\sqrt{3}}{2}x\right)}_{SG/H_A.}+\underbrace{Ae^{3x}+Bx+D}_{y_P/Q.}$$

$$y_p=Ae^{3x}+Bx+D$$

$$\frac{dy}{dx}=3Ae^{3x}+B+(0)$$

$$\frac{d^2y}{dx^2}=9Ae^{3x}+(0)$$

$$\frac{d^3y}{dx^3}=27Ae^{3x}$$

$$\left(27Ae^{3x}+27\left(Ae^{3x}+Bx+D\right)\right)=5e^{3x}+2x$$

$$54Ae^{3x}+27Bx+27D=5e^{3x}+2x$$

$54A=5$ $\quad A=\frac{5}{54}$

$27B=2$ $\quad B=\frac{2}{27}$

$27D=0$ $\quad D=0$

$$(m-2)^3 \Rightarrow m^3 - 6m^2 + 12m - 8 = 0$$

$$y = c_1 e^{2x} + c_2 x e^{2x} + c_3 x^2 e^{2x}$$

$$\frac{d^3y}{dx^3} - 6\frac{d^2y}{dx^2} + 12\frac{dy}{dx} - 8y = 0$$