Método de Resolución de Coeficientes Homogéneos

EDO(1)NL.

$$M(x,y) + N(x,y)\frac{dy}{dx} = 0$$

Si $x \to \lambda x$; $y \to \lambda y$

$$M(\lambda x,\lambda y) = \lambda^m M(x,y)$$
$$N(\lambda x,\lambda y) = \lambda^n N(x,y) \qquad m=n$$

se cumple. EDO(1)NL $\to$ CH.

$$\sqrt{x^2-y^2} + y - x\frac{dy}{dx} = 0$$

$$M(x,y) = \sqrt{x^2-y^2} + y$$
$$N(x,y) = -x$$

$$M(\lambda x,\lambda y) = \sqrt{(\lambda x)^2-(\lambda y)^2} + (\lambda y)$$
$$= \sqrt{\lambda^2 x^2 - \lambda^2 y^2} + (\lambda y)$$
$$= \sqrt{\lambda^2(x^2-y^2)} + \lambda y$$
$$= \sqrt{\lambda^2}\sqrt{(x^2-y^2)} + \lambda y$$
$$= \lambda\sqrt{x^2-y^2} + \lambda y$$
$$= \lambda\left(\sqrt{x^2-y^2} + y\right) \qquad m=1$$

$$N(\lambda x,\lambda y) = -(\lambda x)$$
$$= \lambda(-x) \qquad n=1 \qquad m=n$$

EDO(1)NL $\to$ CH.

$$\sqrt{x^2-y^2}+y-x\frac{dy}{dx}=0 \qquad CH.$$

$$\boxed{\begin{aligned} y(x) &= u(x)\cdot x \\ \frac{dy(x)}{dx} &= u(x)+x\frac{du(x)}{dx}\end{aligned}}$$

$$\sqrt{x^2-(u\cdot x)^2}+\cancel{ux}-\cancel{x}(u+x\frac{du}{dx})=0$$

$$\sqrt{x^2-u^2x^2}+(0)-x^2\frac{du}{dx}=0$$

$$\sqrt{x^2(1-u^2)}-x^2\frac{du}{dx}=0$$

$$\sqrt{x^2}\sqrt{1-u^2}-x^2\frac{du}{dx}=0$$

$$x\sqrt{1-u^2}-x^2\frac{du}{dx}=0$$

$$P=x \quad Q=\sqrt{1-u^2}$$

$$R=x^2 \quad S=-1 \qquad VS$$

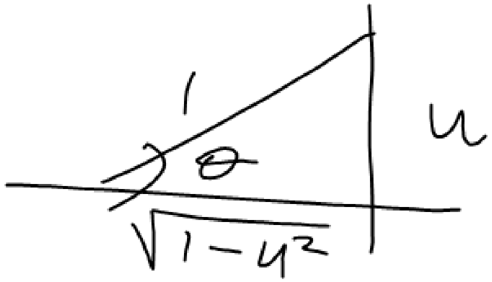
SG

$$\int\frac{P}{R}dx+\int\frac{S}{Q}du=C_1$$

$$\int\frac{x}{x^2}dx-\int\frac{du}{\sqrt{1-u^2}}=C_1$$

$$\int\frac{dx}{x}-\int\frac{du}{\sqrt{1-u^2}}=C_1$$

$$\int \frac{du}{\sqrt{1-u^2}}$$



$$\int \frac{\cos(\theta)\, d\theta}{\cos(\theta)}$$

$$\frac{\sqrt{1-u^2}}{1} = \cos(\theta)$$

$$\frac{u}{1} = \operatorname{sen}(\theta)$$

$$du = \cos(\theta)\, d\theta$$

$$\int d\theta \Rightarrow \theta$$

$$\theta \Rightarrow \operatorname{ang\,sen}(u)$$

$$\int \frac{dx}{x} - \int \frac{du}{\sqrt{1-u^2}} = C$$

$$L(x) - \operatorname{arcsen}(u) = C$$

$$-\operatorname{arcsen}(u) = C_1 - Lx$$

$$\operatorname{arcsen}(u) = Lx - C_1$$

$$u = \operatorname{sen}(Lx - C_1)$$

$$y = u \cdot x$$

$$\boxed{u = \frac{y}{x}}$$

$$\frac{y}{x} = \operatorname{sen}(Lx - C_1)$$

$$\boxed{y = x \operatorname{sen}(Lx - C_1)}$$

$$y\left(y^2+2x^2\right)-2x\left(x^2+y^2\right)\frac{dy}{dx}=0$$