A

e^{At} $\quad \frac{d}{dt}e^{At} = Ae^{At}$

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

Método de Separación Variables
para EDenDP.

$$\frac{\partial^2 z}{\partial x^2} + 4\frac{\partial z}{\partial y} = z$$

H_0: $z(x,y) = F(x)\cdot G(y)$

$$\left\{\begin{array}{l} z = F(x) + G(y) \\ z = F(x)\cdot Ly \\ z = Lx\cdot G(y) \\ \vdots \end{array}\right.$$

$$\frac{\partial z}{\partial x} = F'\cdot G \qquad \frac{\partial^2 z}{\partial x^2} = F''\cdot G$$

$$\frac{\partial z}{\partial y} = F\cdot G'$$

$$F''G + 4F\cdot G' = FG$$

$$F''G = -4F\cdot G' + F\cdot G \qquad F''G - FG = -4FG'$$

$$F''G = (-4G' + G)F \qquad (F'' - F)G = -4G'F$$

$$\frac{F''}{F} = \frac{-4G' + G}{G} \qquad \frac{F'' - F}{F} = \frac{-4G'}{G}$$

$$\frac{F''-F}{F}=\frac{-4G'}{G}$$

$$\frac{F''-F}{F}=\alpha \qquad \frac{-4G'}{G}=\alpha$$

$\alpha=0$, $\alpha>0$ $\alpha<0$

si $\alpha=0$

$$F''-F=0 \qquad \frac{-4G'}{G}=0$$

$$(D^2-1)F=0 \qquad -4G'=0$$

$$(D+1)(D-1)F=0 \qquad G'=0$$

$$F(x)=C_1e^{-x}+C_2e^{x} \qquad G(y)=C_3$$

$$Z(x,y)_{\alpha=0}=C_3\left(C_1e^{-x}+C_2e^{x}\right)$$

$$Z(x,y)_{\alpha=0}=C_{10}e^{-x}+C_{20}e^{x}$$

para $\alpha>0$ $\alpha=\beta^2$ $\forall\beta\neq0\in\mathbb{R}$

$$\frac{F''-F}{F}=\beta^2 \qquad \frac{-4G'}{G}=\beta^2$$

$$F''-F=\beta^2F \qquad -4G'=\beta^2G$$

$$F''-(1+\beta^2)F=0 \qquad G'=-\frac{\beta^2}{4}G$$

$$\left(D^2-(1+\beta^2)\right)F=0 \qquad G'+\frac{\beta^2}{4}G=0$$

$$\left(D-\sqrt{1+\beta^2}\right)\left(D+\sqrt{1+\beta^2}\right)F=0 \qquad G(y)=C_3e^{-\frac{\beta^2}{4}y}$$

$$F(x)=C_1e^{\sqrt{1+\beta^2}x}+C_2e^{-\sqrt{1+\beta^2}x}$$

$$Z(x,y)_{\alpha>0}=C_3\left(C_1e^{\sqrt{1+\beta^2}x}+C_2e^{-\sqrt{1+\beta^2}x}\right)e^{-\frac{\beta^2}{4}y}$$

$$Z(x,y)_{\alpha>0}=\left(C_{10}e^{\sqrt{1+\beta^2}x}+C_{20}e^{-\sqrt{1+\beta^2}x}\right)e^{-\frac{\beta^2}{4}y}$$

Para $\alpha < 0$ $\quad \alpha = -\beta^2 \ \forall \beta \neq 0 \in \mathbb{R}$

$$\frac{F'' - F}{F} = -\beta^2 \qquad \frac{-4G'}{G} = -\beta^2$$

$$F'' - F = -\beta^2 F \qquad G' = \frac{\beta^2}{4} G$$

$$F'' + (-1 + \beta^2) F = 0 \qquad G' - \frac{\beta^2}{4} G = 0$$

$$\left(D^2 + (\beta^2 - 1)\right) F = 0 \qquad \left(D - \frac{\beta^2}{4}\right) G = 0$$

$$\left(D^2 + \left(\sqrt{\beta^2 - 1}\right)^2\right) F = 0 \qquad G(y) = C_3 e^{\frac{\beta^2}{4} y}$$

$$F(x) = C_1 \cos\left(\sqrt{\beta^2 - 1}\, x\right) + C_2 \operatorname{sen}\left(\sqrt{\beta^2 - 1}\, x\right)$$

$$\beta^2 - 1 > 0$$

$$\beta^2 > 1$$

$$F(x)_{\substack{\alpha < 0 \\ \beta^2 > 1}} = C_1 \cos\left(\sqrt{\beta^2 - 1}\, x\right) + C_2 \operatorname{sen}\left(\sqrt{\beta^2 - 1}\, x\right)$$

$$z(x,y)_{\substack{\alpha < 0 \\ \beta^2 > 1}} = C_3 \left(C_1 \cos\left(\sqrt{\beta^2 - 1}\, x\right) + C_2 \operatorname{sen}\left(\sqrt{\beta^2 - 1}\, x\right)\right) e^{\frac{\beta^2}{4} y}$$

$$z(x,y)_{\substack{\alpha < 0 \\ \beta^2 > 1}} = \left(C_{10} \cos\left(\sqrt{\beta^2 - 1}\, x\right) + C_{20} \operatorname{sen}\left(\sqrt{\beta^2 - 1}\, x\right)\right) e^{\frac{\beta^2}{4} y}$$

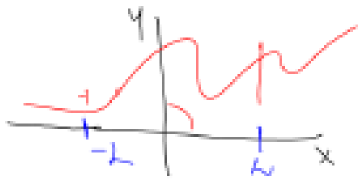
$$z(x,y)_{\substack{\alpha < 0 \\ \beta^2 < 1}} = \left(C_{10} e^{\sqrt{1 - \beta^2}\, x} + C_{20} e^{-\sqrt{1 - \beta^2}\, x}\right) e^{\frac{\beta^2}{4} y}$$

$$\boxed{\begin{gathered} \left(D^2 + \beta^2 - 1\right) F(x) \\ m^2 + \beta^2 - 1 = 0 \\ m^2 = -\left(\beta^2 - 1\right) \\ m = \pm\sqrt{\beta^2 - 1}\, i \end{gathered}}$$

$$P(D)\,z(x,y)=0$$

SOL GRA $z(x,y)=F_1(x,y)+F_2(x,y)+\dots+F_n(x,y)$

SERIE TRIGONOMÉTRICA FOURIER



x^2

$$\cos(ax) \perp \operatorname{sen}(ax)$$

$$f(x)=\frac{a_0}{2}+\sum_{n=1}^{\infty}\left(a_n\cos\left(\frac{n\pi x}{L}\right)+b_n\operatorname{sen}\left(\frac{n\pi x}{L}\right)\right)$$

$$a_0=\frac{1}{L}\int_{-L}^{L} f(x)\,dx$$

$$a_n=\frac{1}{L}\int_{-L}^{L} f(x)\cos\left(\frac{n\pi x}{L}\right)dx$$

$$b_n=\frac{1}{L}\int_{-L}^{L} f(x)\operatorname{sen}\left(\frac{n\pi x}{L}\right)dx$$