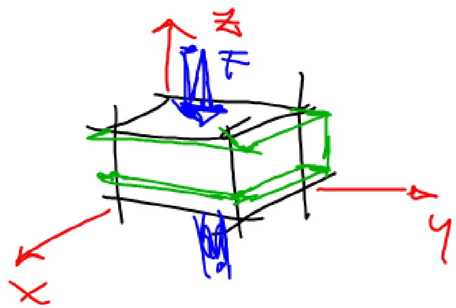
CAP. V

ECUACIONES DIFERENCIALES EN DERIVADAS PARCIALES

ED
- EDO — $y(x)$ — la incógnita es función de una sóla variable independiente.
- EDenDP — $z(x,y)$, $f(x,y,z)$ — la incógnita es función de dos o más variables independientes.

$$F\left(x, y, z(x,y), \frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, \ldots\right) = 0$$

	MÉTODOS	VIDA REAL
EDO	80%	20%
EDenDP	20%	80%

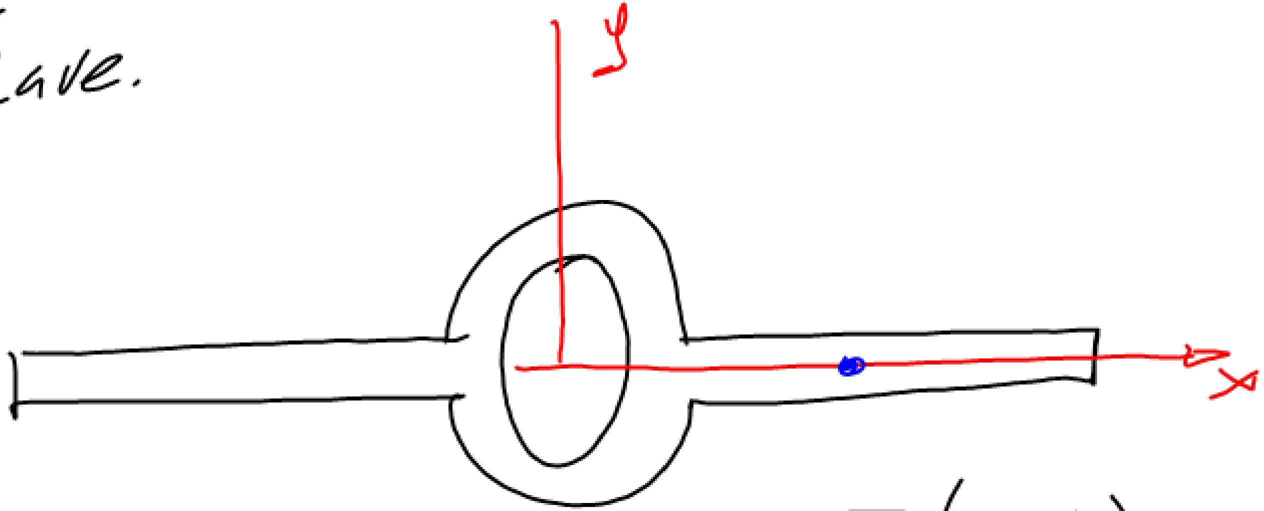


$z(x,y)$

MECÁNICA DEL MEDIO CONTÍNUO

$$\frac{\partial^2 z}{\partial x^2} + k^2 \frac{\partial^2 z}{\partial y^2} = 0.$$

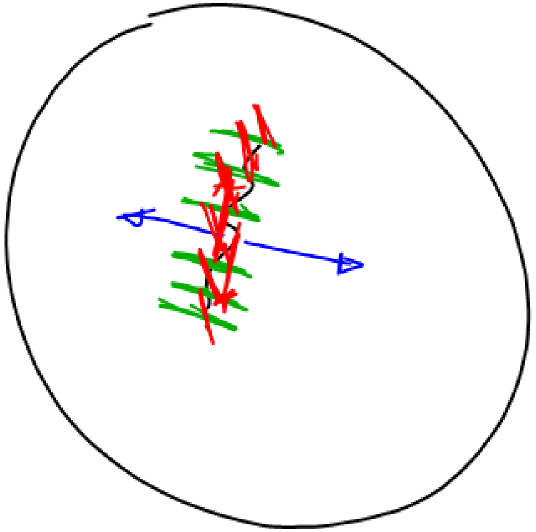
Álave.

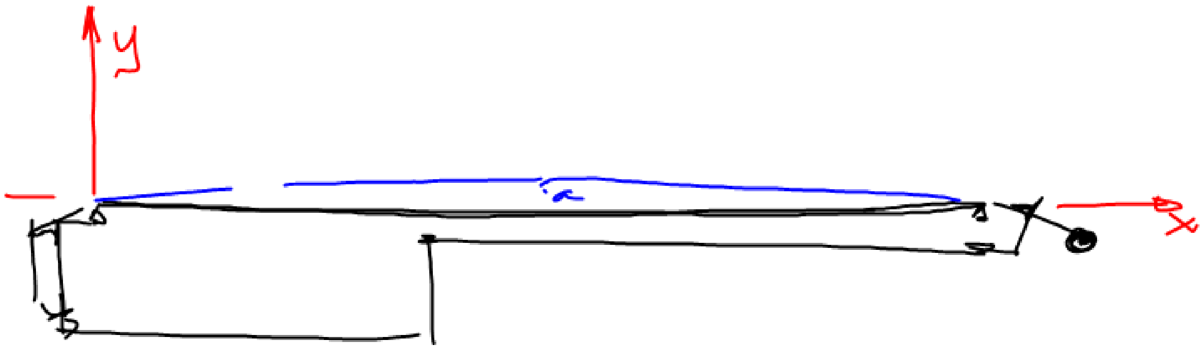


$$\frac{\partial T}{\partial x} + k^2 \frac{\partial^2 T}{\partial t^2} = 0$$

$T(x,t)$

$T(x,y,t)$





$$\boxed{\frac{\partial^2 y}{\partial x^2} = k^2 \frac{\partial^2 y}{\partial t^2}} \qquad k^2 = \frac{\sigma}{\rho}$$

$$F\left(x, y, z(x,y), \frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, \ldots\ldots\right) = 0$$

ED en DP.

orden:

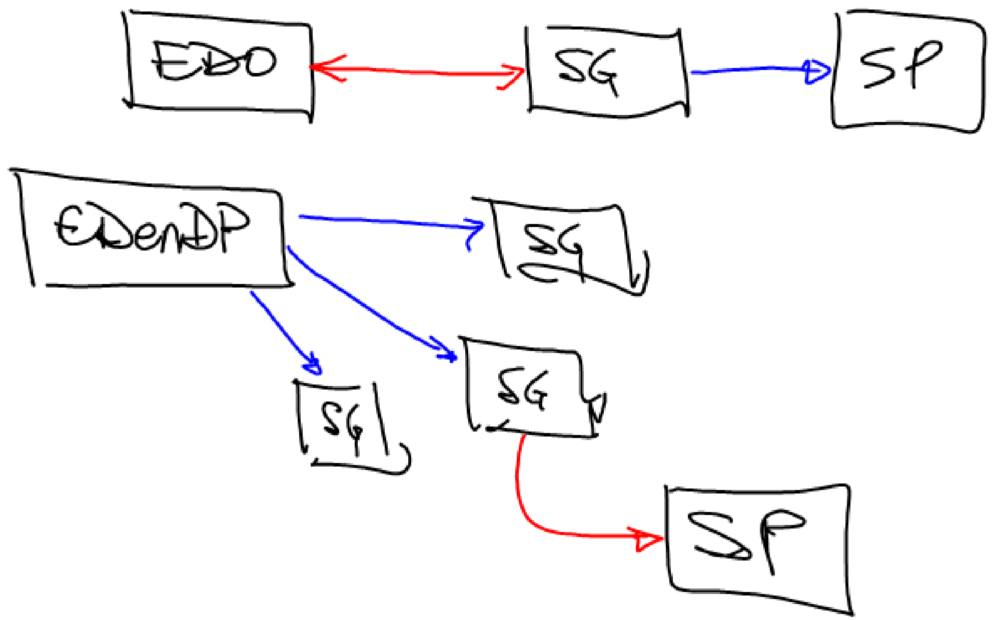
$$\frac{\partial^2 z}{\partial x^2} + \frac{\partial z}{\partial y} = 0 \qquad \text{orden} = 2$$

linealidad $\begin{cases} \text{LINEALES} \\ \text{CUASILINEALES} \\ \text{NO LINEALES} \end{cases}$

$$\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = z^n \qquad n > 2 \leftarrow \text{CUASILINEAL}$$

$$z\frac{\partial z}{\partial x} + \frac{\partial^2 z}{\partial y^2} = 0 \leftarrow \text{NO LINEAL}$$

LA SOLUCIÓN GENERAL DE UNA EDenDP. PUEDE NO SER ÚNICA



MÉTODO DE ÓRDENES IGUALES

MÉTODO DE VARIABLES SEPARABLES.

$$\boxed{\begin{array}{l}\text{SEMESTRE 2015-2}\\ \text{CLAVE 1308 \quad EC. DIF.}\\ \text{GRUPO 7 \quad JUAN URSUL}\\ \text{TEORIA \quad NUM PROF = 1}\end{array}}$$

$z(x,y)$

$$\frac{\partial^2 z}{\partial x^2} + 5\frac{\partial^2 z}{\partial x \partial y} + 6\frac{\partial^2 z}{\partial y^2} = 0$$

$z(y + mx)$ Hipótesis

$z(u) \longrightarrow u = y + mx$

$$\frac{\partial z}{\partial x} = \frac{dz}{du} \cdot \frac{\partial u}{\partial x} \qquad \frac{\partial z}{\partial x} = z' \cdot (m) \Rightarrow m \cdot z'$$

$$\frac{\partial z}{\partial y} = \frac{dz}{du} \cdot \frac{\partial u}{\partial y} \qquad \frac{\partial z}{\partial y} = z' \cdot (1) \Rightarrow z'$$

$\partial/\partial x$

$$\frac{\partial^2 z}{\partial x^2} = z'' \cdot (m) \cdot (m) \rightarrow \boxed{\frac{\partial^2 z}{\partial x^2} = m^2 \cdot z''}$$

$\partial/\partial y$

$$\boxed{\frac{\partial^2 z}{\partial x \partial y} = m \cdot z''}$$

$\partial/\partial y$

$$\boxed{\frac{\partial^2 z}{\partial y^2} = z''}$$

$$m^2 Z'' + 5m Z'' + 6Z'' = 0$$

$$(m^2+5m+6)\cdot Z'' = 0 \qquad Z(u)$$

trivial. $Z''=0 \qquad Z' = k_1 \qquad Z = k_1(u)+k_2$

$$Z = k_1(y+mx)+k_2$$

útil

$$\boxed{Z = k_1 y + k_1 m x + k_2}$$

$$m^2+5m+6=0$$

$$(m+3)(m+2)=0 \qquad m_1=-2 \quad m_2=-3$$

$$Z = y-2x \qquad Z = y-3x$$

$$\frac{\partial z}{\partial x} = -2 \qquad \frac{\partial z}{\partial x \partial y} = 0 \qquad Z = e^{(y-2x)}$$

$$\frac{\partial^2 z}{\partial x^2} = 0 \qquad \frac{\partial z}{\partial y} = 1 \qquad \frac{\partial^2 z}{\partial y^2} = 0 \qquad Z = \cos(y-3x)$$

$$Z_1 = F_1(y-2x) \qquad Z_2 = F_2(y-3x)$$

$$\boxed{Z_g(x,y) = F_1(y-2x) + F_2(y-3x)}$$

$$y(x) = C_1 y_1 + C_2 y_1$$

$$\frac{\partial^2 z}{\partial x^2}+5\frac{\partial^2 z}{\partial x\partial y}+6\frac{\partial^2 z}{\partial y^2}=0$$

$$z_y = F_1(y-2x)+F_2(y-3x)$$

$$\frac{\partial z}{\partial x} = -2F_1'-3F_2'$$

$$\frac{\partial z}{\partial x} = F_1'(y-2x)\cdot(-2)+F_2'(y-3x)\cdot(-3)$$

$$\frac{\partial^2 z}{\partial x^2}=F_1''(y-2x)\cdot(-2)(-2)+F_2''(y-3x)\cdot(-3)(-3)$$

$$=4F_1''+9F_2''$$

$$\frac{\partial^2 z}{\partial x\partial y} = -2F_1''\cdot(1)-3F_2''\cdot(1)$$

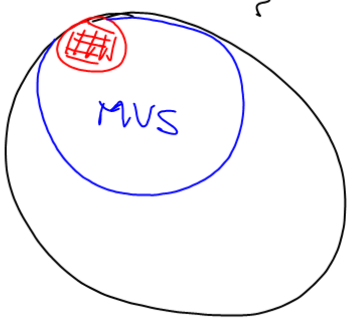
$$\frac{\partial^2 z}{\partial y^2}=F_1''(1)(1)+F_2''\cdot(1)\cdot(1)$$

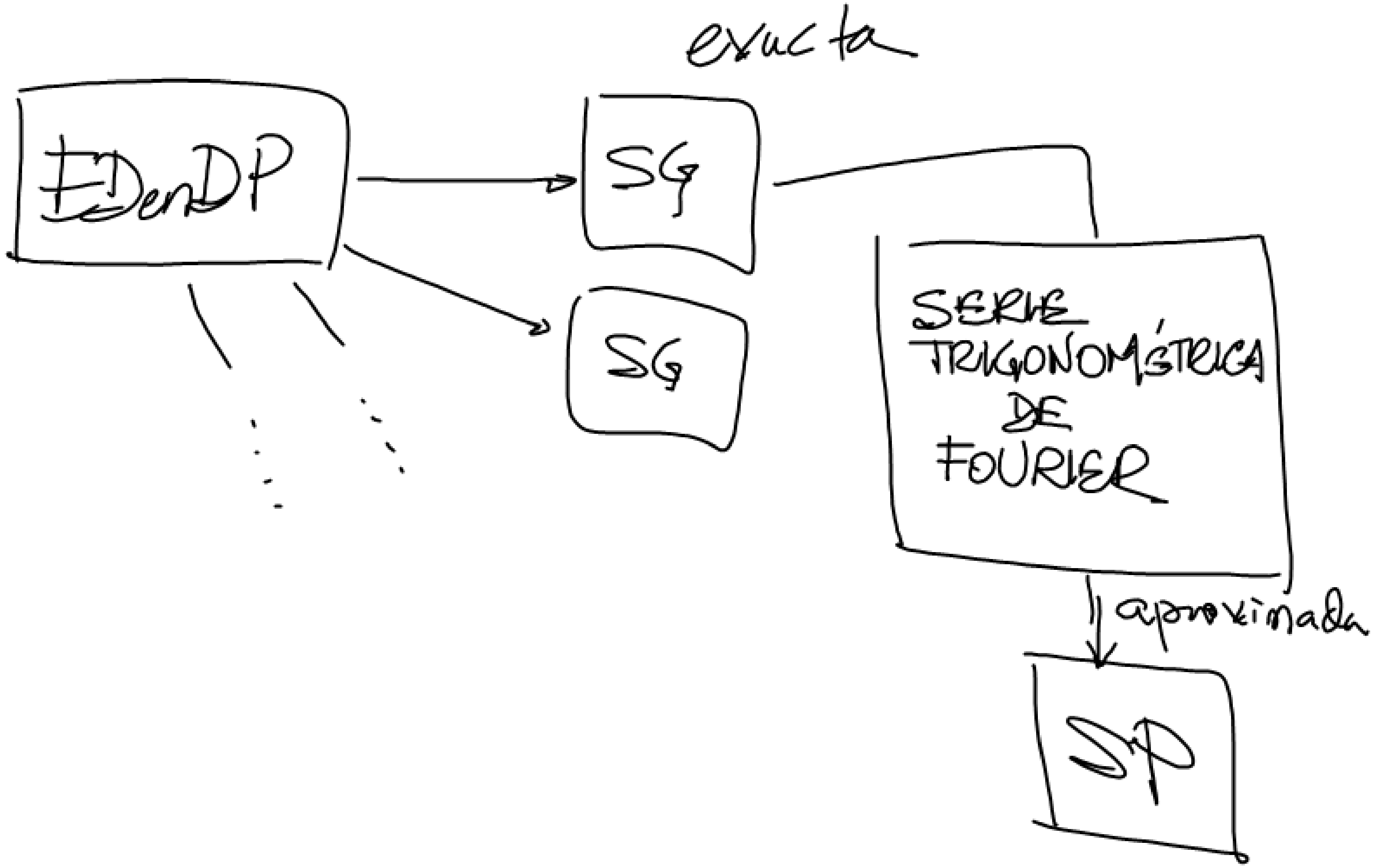
$$(4F_1''+9F_2'')+5(-2F_1''-3F_2'')+6(F_1''+F_2'')=0$$

$$(4-10+6)F_1''+(9-15+6)F_2''=0$$

$$(0)F_1''+(0)F_2''=0$$

$$0=0$$




exacta
EDenDP
SG
SG
SERIE TRIGONOMÉTRICA DE FOURIER
aproximada
SP