

# TEMA IV.- E.D. en Derivadas Parciales (EDenDP)

$$F\left(x, y, z, \frac{\partial z}{\partial x}, \frac{\partial z}{\partial y}, \frac{\partial^2 z}{\partial x^2}, \frac{\partial^2 z}{\partial x \partial y}, \frac{\partial^2 z}{\partial y^2}, \dots\right) = 0$$

{  
 Lineales  
 Cuasilineal  
 No lineales

{  
 Solución  
 General

{  
 CASO 1.- ES ÚNICA  
 CASO 2.- MÚLTIPLES

$$\frac{\partial^2 f}{\partial x^2} + 4 \frac{\partial^2 f}{\partial x \partial y} + 4 \frac{\partial^2 f}{\partial y^2} = 0$$

Posible  
Solución  $f(y+mx)$

$$\frac{\partial f}{\partial x} = m f' \quad \frac{\partial f}{\partial y} = f'$$

$$\frac{\partial^2 f}{\partial x^2} = m^2 f'' \quad \frac{\partial^2 f}{\partial x \partial y} = m f'' \quad \frac{\partial^2 f}{\partial y^2} = f''$$

$$m^2 f'' + 4m f'' + 4 f'' = 0$$

$$(m^2 + 4m + 4) f'' = 0$$

$$f'' = 0 \quad f' = C_1$$

EWA.  
CHARACT.

$$m^2 + 4m + 4 = 0$$

$$(m+2)^2 = 0$$

$$m_1 = m_2 = -2$$

$$f(y+mx) = C_1(y+mx) + C_2$$

$$= C_1 y + C_1 m x + C_2$$

Solución inútil

$$\left\{ \begin{array}{l} f_{g_1} = F_1(y-4x) + F_2(y-4x)x \\ f_{g_2} = F_1(y-4x) + F_2(y-4x)y \end{array} \right.$$

$$\rightarrow \frac{\partial^2 f}{\partial x^2} + 4 \frac{\partial^2 f}{\partial x \partial y} + 4 \frac{\partial^2 f}{\partial y^2} = 0$$

$$f_p = (y-4x)^3 + \sqrt{y-4x} \cdot x$$

$$f_p = \cos(y-4x) + y \operatorname{sen}(y-4x)$$



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



$$z(x+iy)$$

$$\frac{\partial z}{\partial x} = z' \quad \frac{\partial z}{\partial y} = m z'$$

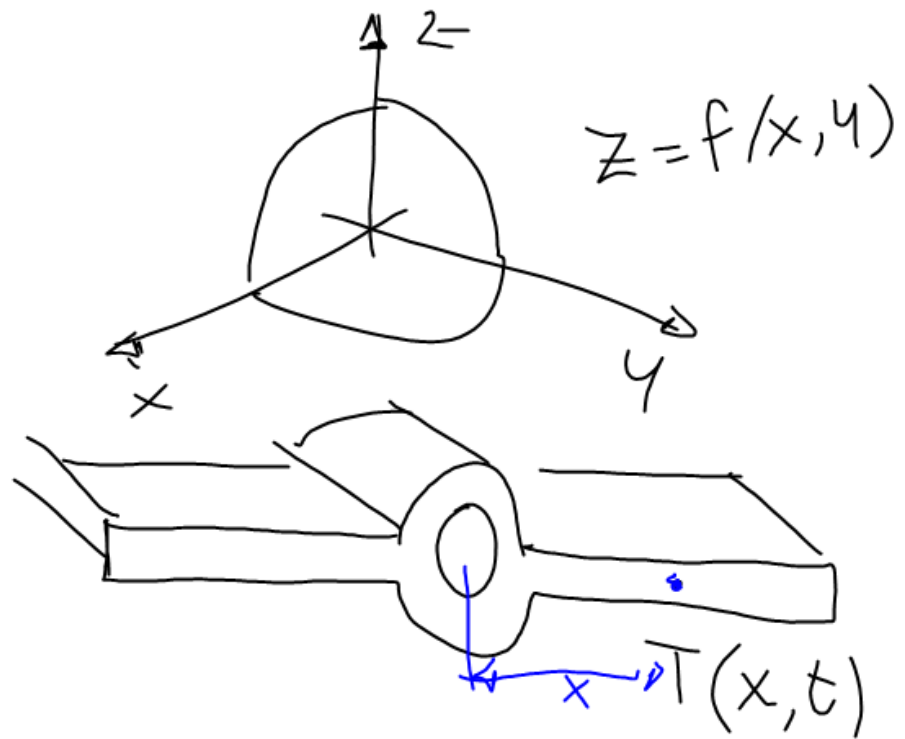
$$\frac{\partial^2 z}{\partial x^2} = z'' \quad \frac{\partial^2 z}{\partial y^2} = m^2 z''$$

$$z'' + m^2 z'' = 0 \quad m^2 + 1 = 0 \quad m^2 = -1 \quad m = \pm i$$

$$z(x,y) = f_1(x+iy) + f_2(x-iy)$$

$$\frac{\partial z}{\partial x} = f_1'(x+iy) + f_2'(x-iy) \quad \frac{\partial^2 z}{\partial x^2} = f_1''(x+iy) + f_2''(x-iy)$$

$$\frac{\partial z}{\partial y} = f_1'(x+iy)i - f_2'(x-iy)i \quad \frac{\partial^2 z}{\partial y^2} = -f_1''(x+iy) - f_2''(x-iy)$$



|        | Progn |     |
|--------|-------|-----|
| EDO    | 80%   | 20% |
| EDenDP | 20%   | 80% |