TEMA 4. ECUACIONES EN DERIVADAS PARCIALES

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

$\longrightarrow z(x,y)$

" Una breve introducción a las EDenDP's "

orden EDenDP será la derivada de mayor orden

$$\frac{\partial z}{\partial x} + 8\frac{\partial z}{\partial y} + 5z = 0$$

EDenDP (1) H.

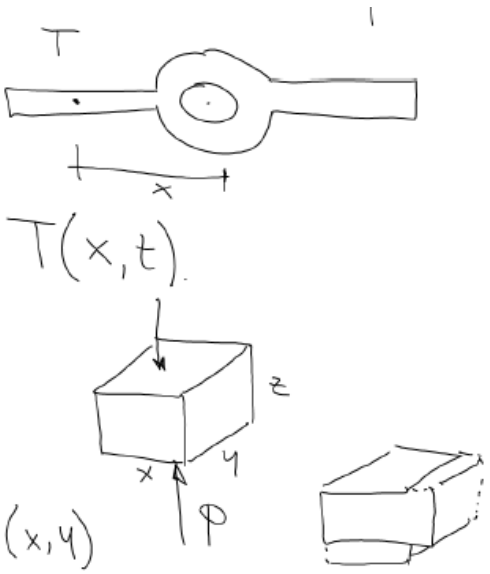
$$\frac{\partial^2 z}{\partial x \partial y} - 6\frac{\partial z}{\partial y} = 0$$ EDenDP (2) H.

$$\frac{\partial^2 z}{\partial x^2} + 9\frac{\partial^2 z}{\partial y^2} + 6z = 5e^x \cos(y)$$

EDenDP (2) NH.

$$z(x,y) = F_1(x,y) + F_2(x,y)$$

g ED	VIDA REAL
EDO	80%	15%
EDenDP	20%	85%



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

$$z = f(y + ax)$$

$$\frac{\partial z}{\partial x} = f'(y+ax)\cdot a$$

$$\frac{\partial z}{\partial y} = f'(y+ax)\cdot 1$$

$$\frac{\partial^2 z}{\partial x^2} = f''(y+ax)\cdot a^2$$

$$\frac{\partial^2 z}{\partial x \partial y} = f''(y+ax)\cdot a$$

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

$$\left[f''(y+ax)\cdot a^2\right]-5\left[f''(y+ax)\cdot a\right]+6\left[f''(y+ax)\right]=0$$

$$\left(a^2-5a+6\right)f''(y+ax)=0$$

$$f''(y+ax)=0$$

$$f'(y+ax)=C_1$$

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

$$f(y+ax)=C_1y+C_1ax+C_2 \quad \text{inútil.}$$

$$a^2-5a+6=0$$

$$(a-3)(a-2)=0 \qquad a_1=2 \quad a_2=3$$

$$Z(x,y)_g=F_1(y+3x)+F_2(y+2x)$$

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

(S6) $z(x,y) = F_1(y+3x) + F_2(y+2x)$

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

$$\frac{\partial^2 z}{\partial x^2} = 9F_1''(y+3x) + 4F_2''(y+2x)$$

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

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

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

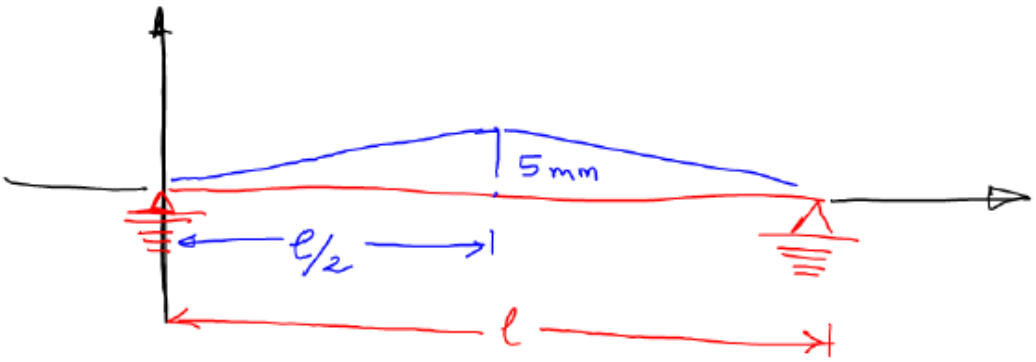
$$\left[9F_1'' + 4F_2''\right) - 5\left(3F_1'' + 2F_2''\right) + 6\left(F_1'' + F_2''\right) = 0$$

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

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

$$0 \equiv 0$$

5



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

$$z(x,y) = f(y + ax)$$

$$\frac{\partial z}{\partial x} = f'(y+ax)\,a$$

$$\frac{\partial z}{\partial y} = f'(y+ax)\cdot 1$$

$$\frac{\partial^2 z}{\partial x^2} = f''(y+ax)\cdot a^2$$

$$\frac{\partial^2 z}{\partial x \partial y} = f''(y+ax)\,a$$

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

$$\left[f''\cdot a^2\right] + 2\left[f''\cdot a\right] + f'' = 0$$

$$(a^2+2a+1)f'' = 0$$

$$a^2+2a+1=0$$

$$(a+1)^2=0 \qquad a_1=-1 \quad a_2=-1$$

$$z(x,y) = F_1(y-x) + xF_2(y-x)$$

$$z(x,y) = F_1(y-x) + yF_2(y-x)$$