EDenDP

medio continuo

fluidos

$f_1(x,y)$ $\qquad f_2(x,y,z)$ $\qquad f_3(x,y,z,t)$

$\frac{\partial f_1}{\partial x}$ $\frac{\partial f_1}{\partial y}$ $\qquad \frac{\partial f_2}{\partial x}$ $\qquad \frac{\partial f_3}{\partial x}$ $\frac{\partial f_3}{\partial y}$

$\frac{\partial f_2}{\partial y}$ $\qquad \frac{\partial f_3}{\partial z}$ $\frac{\partial f_3}{\partial t}$.

$\frac{\partial f_2}{\partial z}$

$f_4(x,t)$

Termodinámica.

EDenDP $\begin{cases} \text{lineales} \\ \text{cuasi-lineales.} \\ \text{no-lineales} \end{cases}$

Solución General puede no ser única

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

EDenDP(2)L

Solución

$$z(x,y) = f(y+mx) \Rightarrow f(u)$$

$$u = y+mx$$

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

$$\frac{\partial z}{\partial y} \Rightarrow z'\cdot\frac{\partial u}{\partial y} \Rightarrow z'$$

$$\frac{\partial^2 z}{\partial x^2} \Rightarrow m z'' \frac{\partial u}{\partial x} \Rightarrow m^2\cdot z''$$

$$\frac{\partial^2 z}{\partial y \partial x} \Rightarrow m z'' \frac{\partial u}{\partial y} \Rightarrow m\cdot z''$$

$$\frac{\partial^2 z}{\partial y^2} \Rightarrow z'' \frac{\partial u}{\partial y} \Rightarrow z''$$

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

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

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

$$m^2+5m+6 = 0 \qquad z' = k_1$$

$$(m+2)(m+3) = 0 \qquad \boxed{z = k_1 u + k_2}$$

$$m_1 = -2 \quad m_2 = -3.$$

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

$$z(x,y) = f_1(y-2x)$$

$$\boxed{z = k_1 y + k_2 + k_3 x}$$

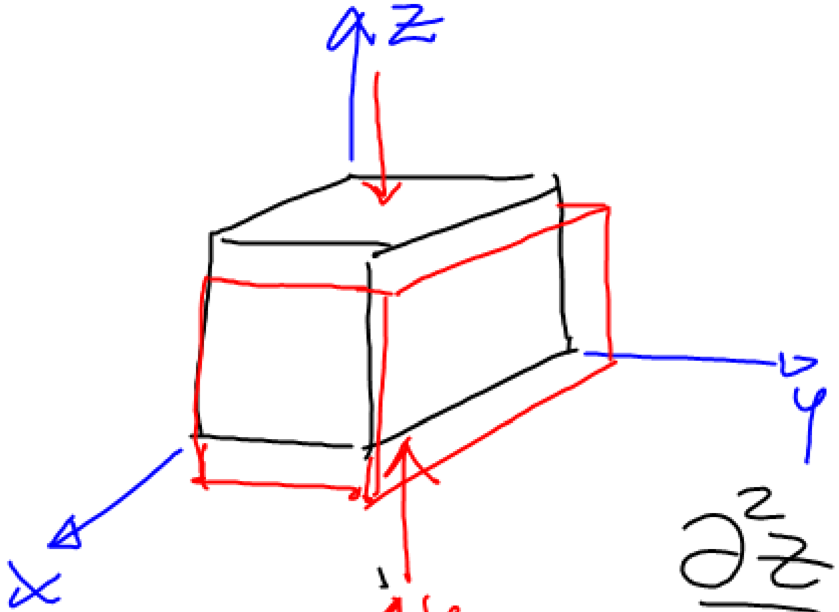
trivial.

$$z(x,y) = f_2(y-3x)$$

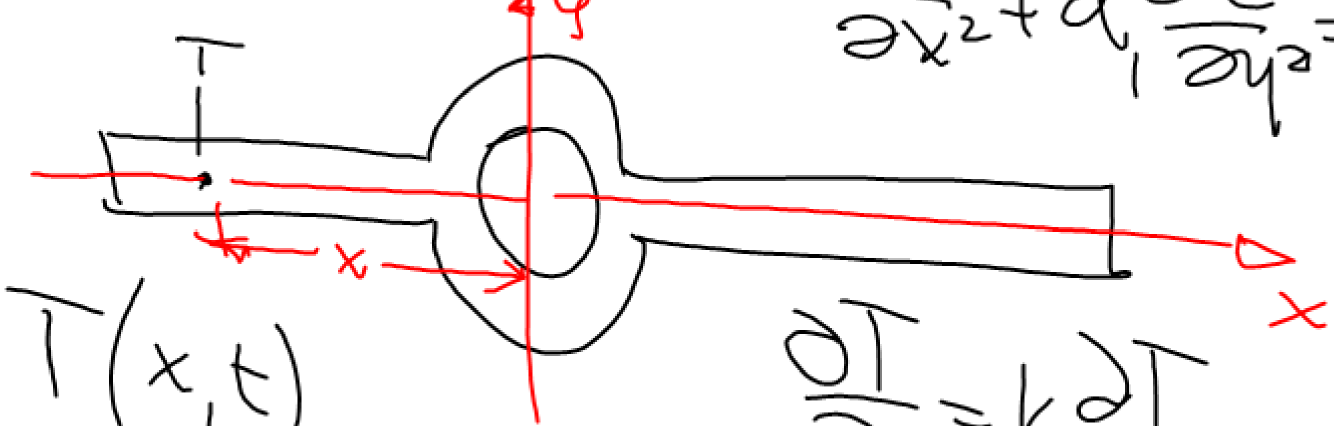
$$\boxed{z(x,y) = f_1(y-2x) + f_2(y-3x)} \text{ general}$$

$$z(x,y) = 4e^{(y-2x)} + 8\tan(y-3x)$$

Particular



$$\frac{\partial^2 z}{\partial x^2} + a_1 \frac{\partial^2 z}{\partial y^2} = 0$$



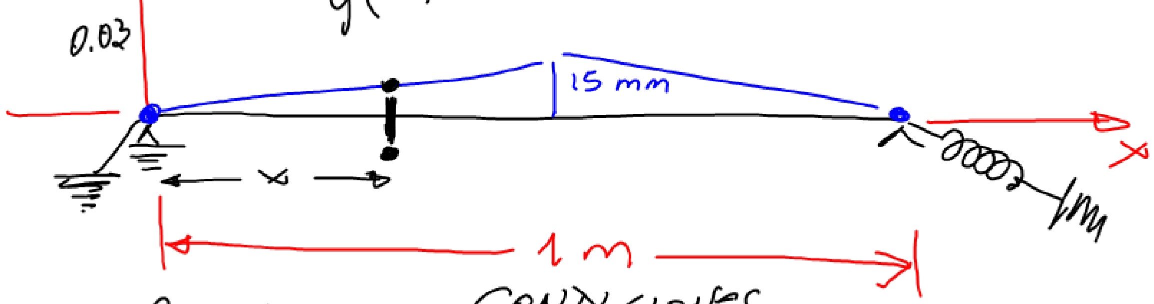
$T(x,t)$

$$\frac{\partial T}{\partial x} = k_2 \frac{\partial T}{\partial t}$$

$k^2 = \frac{T_u}{\rho_u} > 0$

$y(x,t)$

$$\frac{\partial^2 y}{\partial x^2} = k^2 \frac{\partial^2 y}{\partial t^2}$$



CONDICIONES

frontera

$$\begin{cases} y(0,t) = 0 \\ y(1,t) = 0 \end{cases}$$

iniciales

$$y(x,0) = \begin{cases} \frac{0.015}{0.5}x \,;\; 0 \le x < 0.5 \\ 0.03 - \frac{0.015}{0.5}x \,;\; 0.5 \le x < 1 \end{cases}$$

$$v_0 = \left.\frac{\partial y}{\partial t}\right|_{t=0} = 0$$