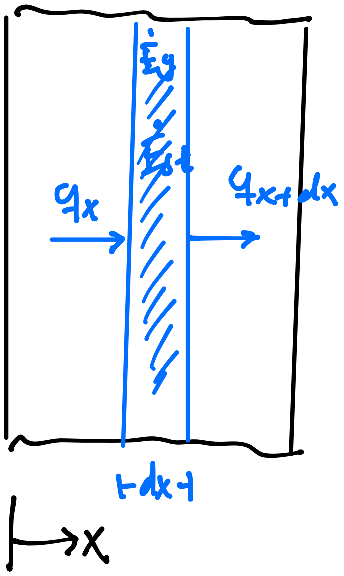


$T(x,t)$

$$q_x - q_{x+dx} + \dot{E}_g = \dot{E}_{st} \quad !$$

$$q_{x+dx} = q_x + \frac{dq_x}{dx}dx + \cdots\cdots$$

$$-\frac{dq_x}{dx}dx + \dot{E}_g = \dot{E}_{st}$$

$$-\frac{\partial}{\partial x}\left(-k\cancel{A}\frac{dT}{dx}\right)\cancel{dx} + \dot{q}\,\cancel{Adx} = \frac{\partial}{\partial t}\left(\rho \cancel{Adx} c_p T\right)$$

$$\div (Adx)$$

$$\frac{\partial}{\partial x}\left(k\frac{\partial T}{\partial x}\right) + \dot{q} = \frac{\partial}{\partial t}(\rho c_p T) \qquad \underbrace{\left(\frac{k}{\rho c_p}\right)}_{\alpha}\frac{\partial^2 T}{\partial x^2} + \frac{\dot{q}}{\rho c_p} = \frac{\partial T}{\partial t}$$

- Estacionario $\frac{\partial}{\partial t} = 0$
- prop. ctes k, ρ, c_p
- sin generación $\dot{q} = 0$

$$k\frac{d^2T}{dx^2} = 0 \qquad \frac{d^2T}{dx^2} = 0 \qquad d\left(\frac{dT}{dx}\right) = 0\,dx$$

$$\int \frac{d^2T}{dx^2}dx = 0 \qquad \frac{dT}{dx} + C_1 = 0 \Rightarrow \frac{dT}{dx} = cte$$

$$q_x = -kA\frac{dT}{dx} = cte$$

$$q_x = -KA(-C_1)$$

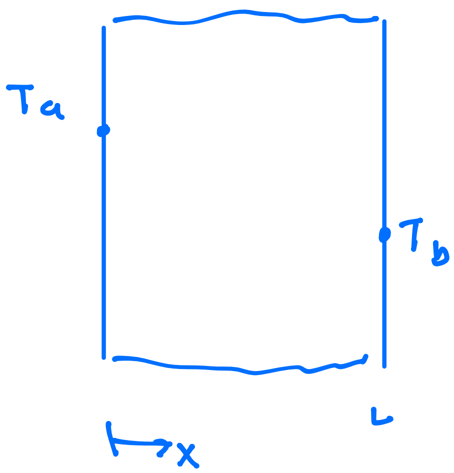
$$q_x = KAC_1$$

$$C_1 = \frac{q_x}{KA}$$

$$\int \left(\frac{dT}{dx} + C_1 \right) dx \quad \int 0 \, dx$$

$$T + C_1 x + C_2 = 0 \implies T = -C_1 x - C_2$$

$$T = -\frac{q_x}{KA} - C_2$$



$x = 0 \quad T(0) = T_a$

$x = L \quad T(L) = T_b$

$$T_a + C_1(0) + C_2 = 0$$

$$T_b + C_1(L) + C_2 = 0$$

$$C_1 = \frac{T_a - T_b}{L} \qquad C_2 = -T_a$$

$$\begin{cases} T(x) = \dfrac{T_b - T_a}{L} x + T_a \\[2ex] q(x) = KA \left(\dfrac{T_a - T_b}{L} \right) \end{cases}$$

$$k\frac{d^2T}{dx^2} + \dot{q} = 0$$

$$\frac{d^2T}{dx^2} = -\frac{\dot{q}}{k}$$

$$\int d\left(\frac{dT}{dx}\right) = \int -\frac{\dot{q}}{k}\,dx$$

$$\frac{dT}{dx} = -\frac{\dot{q}}{k}x + C_1$$

$$\int dT = \int\left(-\frac{\dot{q}}{k}x + C_1\right)dx$$

$$T = \frac{-\dot{q}}{2k}x^2 + C_1x + C_2$$

$$q_x = -kA\frac{dT}{dx} = -kA\left(-\frac{\dot{q}}{k}x + C_1\right)$$

$$T_a = C_2$$

$$T_b = \frac{-\dot{q}}{2k} L^2 + C_1 L + C_2$$

$$T(x) = \frac{-\dot{q}}{2k} x^2 + \left(\frac{L^2 q - 2T_a k + 2T_b k}{2Lk}\right) x + T_a$$

$$q(x) = -kA \frac{dT}{dx} = -kA\left(-\frac{\dot{q}}{k} x + \left(\frac{L^2 q - 2T_a k + 2T_b k}{2Lk}\right)\right)$$