

2º Teste Prático 2021/22

①

2)

$$\frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2} - \mu \frac{\partial T}{\partial x} \quad (*)$$

$$\Leftrightarrow \frac{T(i, n+1) - T(i, n)}{\Delta t} = \alpha \frac{T(i-1, n) - 2T(i, n) + T(i+1, n)}{\Delta x^2} - \mu \frac{T(i+1, n) - T(i-1, n)}{2\Delta x}$$

$$\Leftrightarrow T(i, n+1) - T(i, n) = \Delta t \alpha \frac{T(i-1, n) - 2T(i, n) + T(i+1, n)}{\Delta x^2} - \Delta t \mu \frac{T(i+1, n) - T(i-1, n)}{2\Delta x}$$

$$D = \alpha \frac{\Delta t}{\Delta x^2} \quad e \quad C = \frac{\mu}{2} \frac{\Delta t}{\Delta x}$$

$$\Leftrightarrow T_{i, n+1} = T_{i, n} + D(T_{i+1, n} - 2T_{i, n} + T_{i-1, n}) - C(T_{i+1, n} - T_{i-1, n})$$

②

2)

$$m \frac{d^2 x}{dt^2} = -D v_x \quad (\Rightarrow) \quad \begin{cases} \frac{dv_x}{dt} = -\frac{D}{m} v_x \\ \frac{dx}{dt} = v_x \end{cases}$$

$$m \frac{d^2 y}{dt^2} = -mg - D v_y \quad (\Rightarrow) \quad \begin{cases} \frac{dv_y}{dt} = -g - \frac{D}{m} v_y \\ \frac{dy}{dt} = v_y \end{cases}$$

