

EJERCICIO 08

$$\left\{ \begin{array}{l} \bullet \frac{\partial u}{\partial t} = D \frac{\partial^2 u}{\partial x^2} - u[u-a][1-u] + w \\ \bullet \frac{\partial w}{\partial t} = \varepsilon [u - bw] \end{array} \right.$$

$$\ast D = 0,01$$

$$\ast a = 0,2$$

$$\ast b = 0,3$$

$$\ast \varepsilon = 0,03$$

$$\ast u(x,t) := \text{potencial de acción}$$

$$\ast w(x,t) := \text{variable de recuperación}$$

$$\left\{ \begin{array}{l} \ast 0 \leq t \leq 10 ; Nt = 1000 \\ \ast 0 \leq x \leq 1 ; Nx = 50 \end{array} \right.$$

$$a) \quad \lambda = \frac{D \Delta t}{(\Delta x)^2} = 0,24 < 0,5.$$

$$d) \quad \frac{u_i^{l+1} - u_i^l}{\Delta t} = D \left[\frac{u_{i+1}^l - 2u_i^l + u_{i-1}^l}{(\Delta x)^2} \right] - u_i^l [u_i^l - a][1 - u_i^l] + w_i^l$$

$$\Rightarrow \boxed{u_i^{l+1} = \lambda [u_{i+1}^l - 2u_i^l + u_{i-1}^l] - \Delta t [u_i^l [u_i^l - a][1 - u_i^l]] + \Delta t w_i^l + u_i^l}$$

$$\Rightarrow \cancel{w_i^{l+1}} =$$

$$\bullet \quad \frac{w_i^{l+1} - w_i^l}{\Delta t} = \varepsilon [u_i^l - bw_i^l]$$

$$\Rightarrow \boxed{w_i^{l+1} = \Delta t \varepsilon [u_i^l - bw_i^l] + w_i^l}$$

$$f) \quad u(x=0,6 ; t=8,26) > 0,3$$