Brief Article

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$$\hat{H} = \hbar\omega_c \hat{a}^\dagger \hat{a} + \frac{1}{2}\hbar\omega_a \hat{\sigma}_z + \frac{\hbar\Omega}{2}\left(\hat{a} + \hat{a}^\dagger\right)(\hat{\sigma} + \hat{\sigma}_-)$$

$$\hat{H} = \omega_c \hat{a}^\dagger \hat{a} + \omega_a \hat{\sigma}_z + g\left(\hat{a} + \hat{a}^\dagger\right)(\hat{\sigma} + \hat{\sigma}_-)$$

$$\hat{H} = \omega_c \hat{a}^\dagger \hat{a} + \omega_a \hat{\sigma}_z + g\left(\hat{a} + \hat{a}^\dagger\right)(\hat{\sigma} + \hat{\sigma}_-)$$

$$\Delta v = c\Delta t\left(v - \frac{v^3}{3} + w + I\right)$$

$$\Delta w = -\frac{\Delta t}{c\tau}(v - a + bw)$$

$\frac{dv}{dt} = c\left(v - \frac{v^3}{3} + w + I\right) = 0 \implies w_1 = -(v - \frac{v^3}{3} + I) = \frac{v^3}{3} - v - I$
$\tau\frac{dw}{dt} = -\frac{1}{c}(v - a + bw) \implies w_2 = \frac{1}{b}(a - v)$

$$\frac{dv}{dt} = c\left(v - \frac{v^3}{3} + w + I\right) = 0 \implies w_1 = -(v - \frac{v^3}{3} + I) = \frac{v^3}{3} - v - I$$

$$\frac{dv}{dt} = c\left(v - \frac{v^3}{3} - w + I\right)$$

$$\frac{dw}{dt} = -\frac{1}{\tau c}(v + a - bw)$$

$$\frac{dv}{dt} = c(v - \frac{v^3}{3} + w + I) + k_1\xi$$

$$\frac{dw}{dt} = -\frac{1}{\tau c}(v - a + bw) + k_2\eta$$

$$V_{i+1} = V_i + c\Delta t \left(V_i - \frac{V_i^3}{3} + W_i + I \right)$$

$$W_{i+1} = W_i - \frac{\Delta t}{c\tau} \left(V_i - a + bW_i \right)$$

$$V_{i+1} = V_i + c\Delta t \left(V_i - \frac{V_i^3}{3} + W_i + I \right)$$

$$W_{i+1} = W_i - \frac{\Delta t}{c\tau} \left(V_i - a + bW_i \right)$$

$$V_{i+1} = V_i + \Delta t \left(c(V_i - \frac{V_i^3}{3} + W_i + I) + k_1\xi \right)$$

$$W_{i+1} = W_i + \Delta t \left(-\frac{1}{\tau c}(V_i - a + bW_i) + k_2\eta \right)$$

$$\frac{\partial F(x,y)}{\partial X} = \begin{pmatrix} \frac{\partial F_1(x,y)}{\partial x} \\ \frac{\partial F_2(x,y)}{\partial y} \end{pmatrix}$$

$$J = \begin{pmatrix} \frac{\partial F_1(x,y)}{\partial x} & \frac{\partial F_1(x,y)}{\partial y} \\ \frac{\partial F_2(x,y)}{\partial x} & \frac{\partial F_2(x,y)}{\partial y} \end{pmatrix}$$

3

$$J = \begin{pmatrix} c(1 - v^2) & c \\ -\frac{1}{\tau c} & -\frac{b}{\tau c} \end{pmatrix}$$

$$dX_t = a(t, X_t) + b(t, X_t)dW_t$$

$$X_{n+1} = X_n + a(t_n, X_n)\Delta t + b(t_n, X_n)\Delta W_n$$

$$\Delta W_n = W_{t_{n+1}} - W_{t_n}$$

$$V_{i+1} = V_i + c\Delta t \left(V_i - \frac{V_i^3}{3} + W_i + I \right) + k_1\sqrt{\Delta t}\xi$$

$$W_{i+1} = W_i - \frac{\Delta t}{c\tau}\left(V_i - a + bW_i\right) + k_2\sqrt{\Delta t}\eta$$

$$I = C_m\frac{dV_m}{dt} + \bar{g}_K n^4(V_m - V_k) + \bar{g}_{Na}m^3h(V_m - V_{Na}) + \bar{g}_l(V_m - V_l)$$

$$\frac{dn}{dt} = \alpha_n(V_m)(1-n) - \beta_n(V_m)n$$

$$\frac{dm}{dt} = \alpha_m(V_m)(1-m) - \beta_m(V_m)m$$

$$\frac{dh}{dt} = \alpha_h(V_m)(1-h) - \beta_h(V_m)h$$