

1 “environment” component

This component has no equations.

2 “membrane” component

membrane_voltage_diff_eq

$$\frac{d(V)}{d(time)} = \frac{-((i_{Ca} + i_K + i_{K_{Ca}} + i_{K_{ATP}}))}{Cm}$$

3 “calcium_current” component

i_Ca_calculation

$$i_{Ca} = g_{Ca} * m_{infinity} * (V - V_{Ca})$$

4 “calcium_current_m_gate” component

m_infinity_calculation

$$m_{infinity} = \left(\left(1.0 + e^{\frac{(v_m - V)}{sm}} \right) \right)^{-1.0}$$

5 “delayed_rectifier_potassium_current” component

i_K_calculation

$$i_K = g_K * n * (V - V_K)$$

6 “delayed_rectifier_potassium_current_n_gate” component

n_diff_eq

$$\frac{d(n)}{d(time)} = \frac{(n_infinity - n)}{tau_n}$$

n_infinity_calculation

$$n_infinity = \left(\left(1.0 + e^{\frac{(v_n - V)}{s_n}} \right) \right)^{-1.0}$$

7 “calcium_dependent_potassium_current” component

i_K_Ca_calculation

$$i_K_Ca = g_K_Ca * omega * (V - V_K)$$

8 “calcium_dependent_potassium_current_omega_gate” component

omega_eq

$$omega = \frac{(c)^{5.0}}{\left((c)^{5.0} + (kD)^{5.0} \right)}$$

9 “nucleotide_sensitive_potassium_current” component

i_K_ATP_calculation

$$i_K_ATP = g_K_ATP * a * (V - V_K)$$

10 “nucleotide_sensitive_potassium_current_a_gate” component

a_diff_eq

$$\frac{d(a)}{d(time)} = \frac{(a_infinity - a)}{tau_a}$$

a_infinity_calculation

$$a_infinity = \left(\left(1.0 + e^{\frac{(r - c)}{s_a}} \right) \right)^{-1.0}$$

11 “cytosolic_free_calcium_concentration” component

c_diff_eq

$$\frac{d(c)}{d(time)} = f_{cyt} * (J_{mem} + J_{er})$$

12 “ER_calcium_concentration” component

c_er_diff_eq

$$\frac{d(c_{er})}{d(time)} = -(fer) * V_{cyt_Ver} * Jer$$

13 “calcium_flux_through_the_membrane” component

Jmem_eq

$$J_{mem} = -((alpha * i_{Ca} + k_{PMCA} * c))$$

14 “calcium_influx_into_the_ER” component

J_SERCA_eq

$$J_{SERCA} = k_{SERCA} * c$$

15 “calcium_leak_out_of_the_ER” component

Jleak_eq

$$J_{leak} = pleak * (c_{er} - c)$$

16 “calcium_efflux_through_the_IP3R” component

JIP3_eq

$$J_{IP3} = O_{infinity} * (c_{er} - c)$$

O_infinity_eq

$$O_{infinity} = \left(\frac{c}{(d_{act} + c)} \right)^{3.0} * \left(\frac{IP3}{(d_{IP3} + IP3)} \right)^{3.0} * \left(\frac{c}{(d_{inact} + c)} \right)^{3.0}$$

17 “net_calcium_efflux_out_of_the_ER” component

Jer_eq

$$Jer = ((J_{leak} + J_{IP3}) - J_{SERCA})$$