

1 “environment” component

This component has no equations.

2 “total_cytoplasmic_Ca_flux” component

J_ICa_calculation

$$J_{ICa} = \frac{I_{Ca}}{2.0 * F * v_i * k_i}$$

3 “Ca_extrusion_across_the_plasma_membrane” component

J_pm_calculation

$$J_{pm} = (J_{extru} + J_{ICa})$$

J_extru_calculation

$$J_{extru} = \left(k_{leak} * (Ca_i - Ca_o) + \frac{Vmax_{extru}}{\left(1.0 + \left(\frac{EC50_{extru}}{Ca_i}\right)^{n_{extru}}\right)} \right)$$

4 “Ca_uptake_by_SR_Ca_ATPase” component

J_SERCA_calculation

$$J_{SERCA} = \frac{Vmax_{SERCA}}{\left(1.0 + \left(\frac{EC50_{SERCA}}{Ca_i}\right)^{n_{SERCA}}\right)}$$

5 “ER_Ca_release” component

J_release_calculation

$$J_{release} = P_{ER} * (Ca_i - Ca_{ER})$$

J_ER_calculation

$$J_{ER} = (J_{SERCA} + J_{release})$$

P_ER_calculation

$$P_{ER} = \left(P_{basal} + \frac{P_{max_RyR}}{\left(1.0 + \left(\frac{EC50_RyR}{Ca_i} \right)^{n_RyR} \right)} \right)$$

6 “cytoplasmic_calcium” component

Ca_i_diff_eq

$$\frac{d(Ca_i)}{d(time)} = -(J_i)$$

J_i_calculation

$$J_i = (J_{pm} + J_{ER})$$

7 “intraluminal_calcium” component

Ca_ER_diff_eq

$$\frac{d(Ca_{ER})}{d(time)} = \frac{J_{ER}}{\gamma_{ER}}$$

gamma_ER_calculation

$$\gamma_{ER} = \frac{v_{ER} * k_{ER}}{v_i * k_i}$$