

Siegiert Neuron

Input

$$\begin{pmatrix} \vec{\lambda}_e, \vec{\lambda}_i \\ \vec{w}_e, \vec{w}_i \end{pmatrix}$$

A

$$\begin{aligned} \mu_Q &= \tau_m (\vec{w}_e \vec{\lambda}_e + \vec{w}_i \vec{\lambda}_i) \\ \sigma_Q^2 &= \frac{\tau_m}{2} (\vec{w}_e^2 \vec{\lambda}_e + \vec{w}_i^2 \vec{\lambda}_i) \end{aligned}$$

B

$$\begin{aligned} \Upsilon &= V_{\text{rest}} + \mu_Q \\ \Gamma &= \sigma_Q \end{aligned}$$

C

$$\lambda_{out} = \Phi(\Upsilon, \Gamma)$$

$$= \left(t_{\text{ref}} + \frac{\tau_m}{\Gamma} \sqrt{\frac{\pi}{2}} \int_{V_{\text{reset}} + k\gamma\Gamma}^{V_{\text{th}} + k\gamma\Gamma} du \cdot \exp \left[\frac{(u - \Upsilon)^2}{2\Gamma^2} \right] \cdot \left[1 + \text{erf} \left(\frac{u - \Upsilon}{\Gamma\sqrt{2}} \right) \right] \right)^{-1},$$

where $k = \sqrt{\tau_{syn}/\tau_m} < 1$ and $\gamma = |\zeta(1/2)|$ for ζ being the Riemann zeta function.

Output

$$\lambda_{out}$$