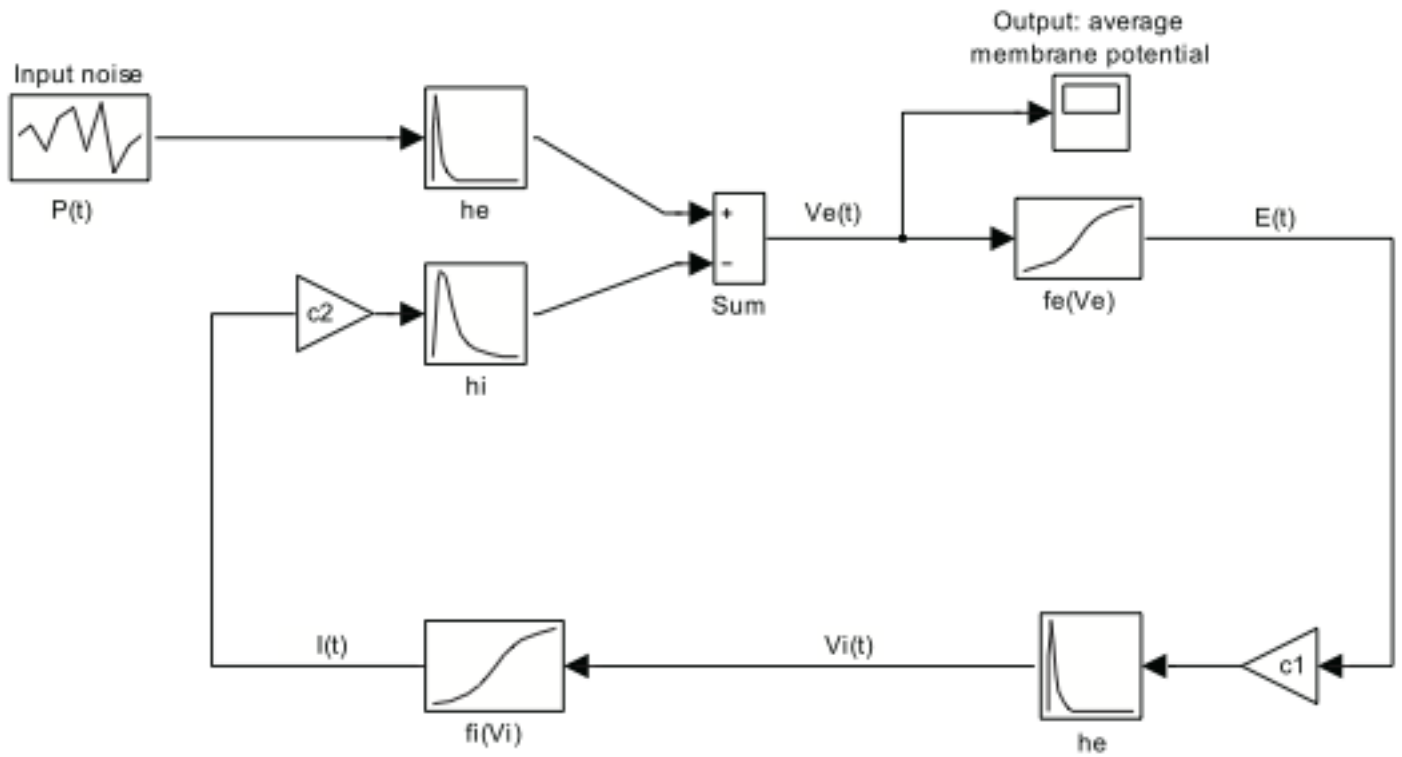
Lopes da Silva Model



Lopes da Silva Model - Specification

Impulse responses:

$$h_e(t) = A[\exp(-\alpha_1 t) - \exp(-\alpha_2 t)]$$

$$h_i(t) = B[\exp(-\beta_1 t) - \exp(-\beta_2 t)]$$

A = 1.6 mV; α_1 = 55 s^{-1}; α_2 = 605 s^{-1}

B = -32 mV; β_1 = 27.5 s^{-1}; β_2 = 55 s^{-1}

Sigmoidal Function:

$$f(V) = f_{\max}\left[1 + \exp\left(\frac{V - V_{th}}{\sigma}\right)\right]^{-1}$$

f_{max} = 50 pps; V_{th} = 7 mV; σ =-2 mV

Coupling constants:

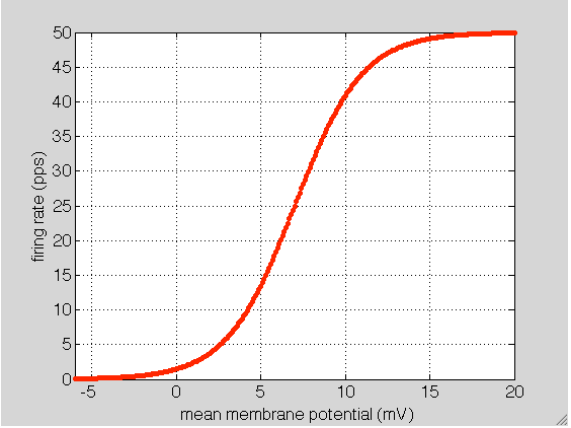
C_1 = 32

C_2 = 3

Noise Input:

<P> = 450 pps

σ^2 = 100 pps^2



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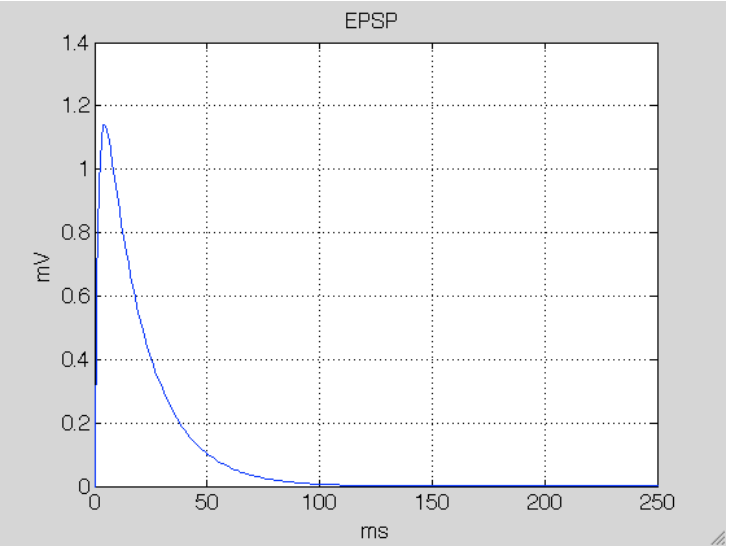

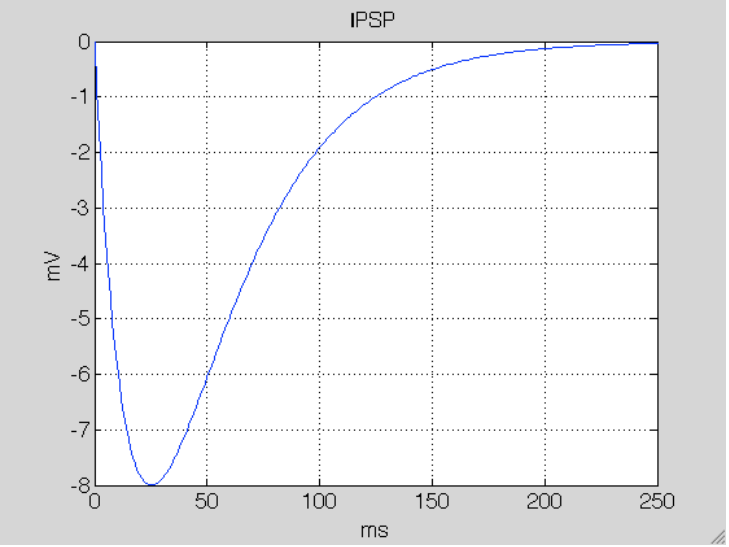

Laplace Transform of functions $h_{e,i}(t)$

Laplace transform:

$$\int_0^\infty e^{-st} e^{-\alpha t}\, dt = \int_0^\infty e^{-(s+\alpha)t}\, dt = -\frac{1}{s+\alpha} e^{-(s+\alpha)t}\Big|_0^\infty = 0 - \left[-\left(\frac{1}{s+\alpha}\right)\right] = \frac{1}{s+\alpha}$$

Laplace transform of functions h_e i h_i:

$$h_e(t) = A[\exp(-\alpha_1 t) - \exp(-\alpha_2 t)]$$

$$h_e(s) = A\left(\frac{1}{s+\alpha_1} - \frac{1}{s+\alpha_2}\right)$$

$$h_i(t) = B[\exp(-\beta_1 t) - \exp(-\beta_2 t)]$$

$$h_i(s) = B\left(\frac{1}{s+\beta_1} - \frac{1}{s+\beta_2}\right)$$

A = 1.6 mV; α_1 = 55 s^{-1}; α_2 = 605 s^{-1}

B = -32 mV; β_1 = 27.5 s^{-1}; β_2 = 55 s^{-1}

Model output