Alpha Neuron

Computational Neuroscience by University of Washington

The following code models an integrate-and-fire neuron receiving input spikes through an alpha synapse:

Matlab:

alpha_neuron.m

Python:

alpha_neuron.py

The parameter "t_{peak}" controls when the alpha function peaks after an input spike occurs (and hence how long the effects of an input spike linger on in the postsynaptic neuron). "t_{peak}" for excitatory synapses in the brain may vary from 0.5 ms (AMPA or non-NMDA) to 40 ms (NMDA synapse).

Vary the value of t_{peak} from 0.5 ms to 10 ms in steps of 0.5 ms and observe how this influences the output of the neuron for the fixed input spike train used in this code.

Plot the output spike count as a function of t_{peak} for the given input spike train and explain how the value of t_{peak} influences the firing rate of the neuron.