2. Simulation

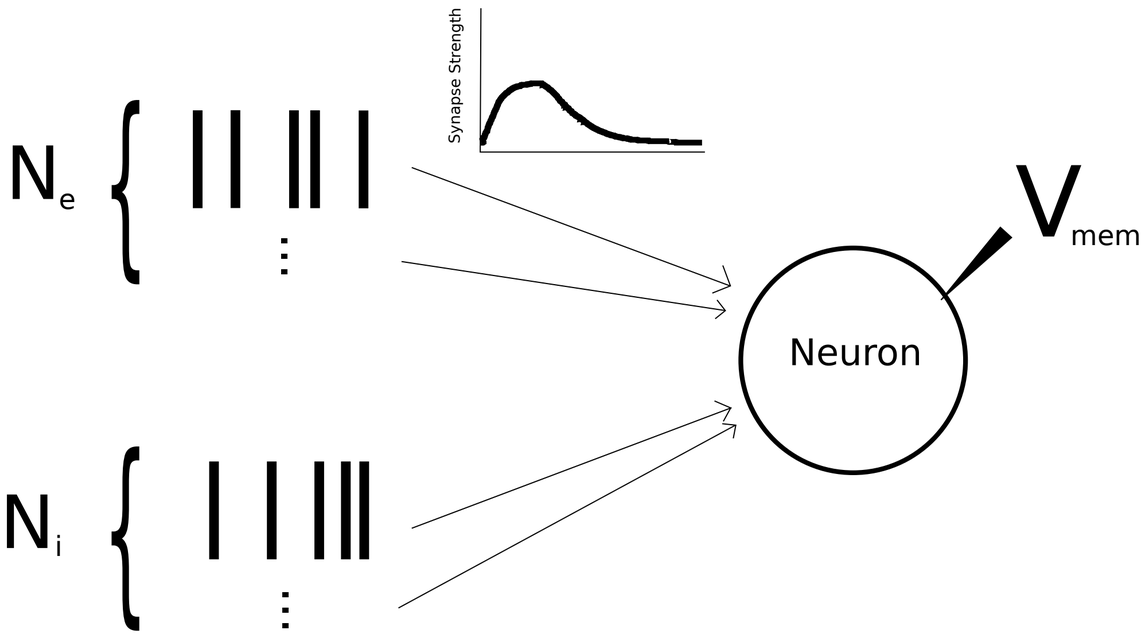

Figure 1 : Diagram of Neuron Simulation

A simulation was developed so the fitting could be tested on known parameter values. This consisted of 1000 poisson processes, approximating input neurons, feeding into a single leaky integrate and fire neuron, approximating the neuron we are recording from.

Simulation Equations

$$\tau_m \frac{dV}{dt} = R_m g_l (E_l - V) + R_m g_e (E_e - V) + R_m g_i (E_i - V)$$

$$\tau_e \frac{dg_e}{dt} = -g_e \qquad \tau_i \frac{dg_i}{dt} = -g_i$$

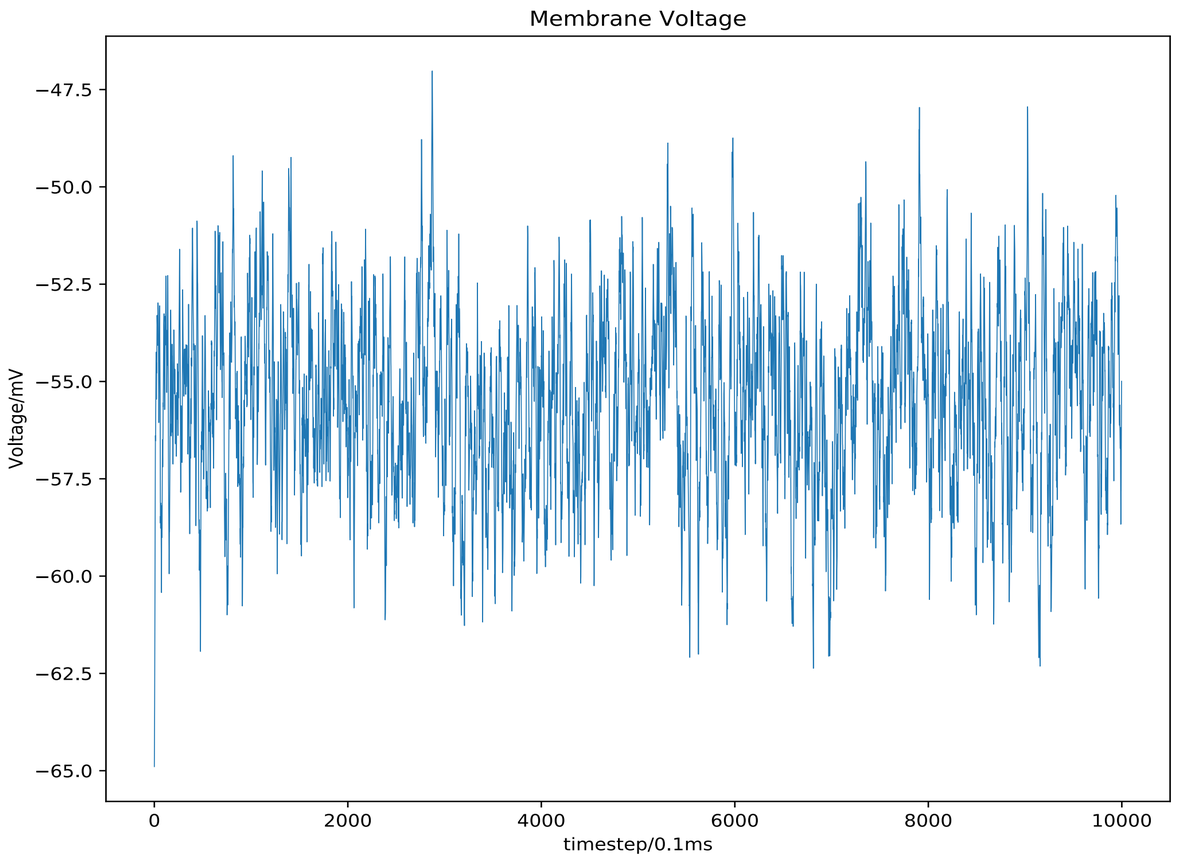

Figure 2 : Sample simulation Voltage trace

As this is a subthreshold model, it has no spiking dynamics and so does not attempt to model activity above ~-45mV as seen in Figure 3

Figure

Figure 3 shows a tra
cell. The model fits
well. However the r
some noise into the
in fitting parameter

4. Po

Simulated Power Spectr

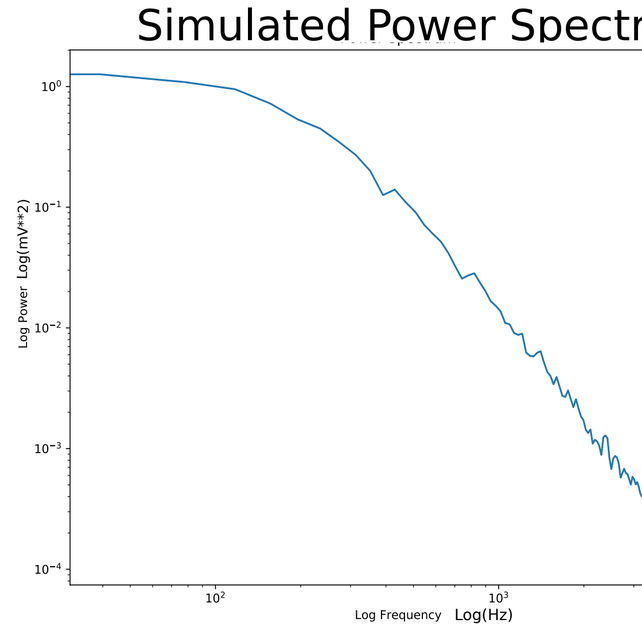

Figure 4 : Simulated co

Power S

$$PS_V(f) = \left(\frac{R^2_{eff}}{1 + (2\pi f \tau$$

ν_x - Ba

(μ_x, σ_x) - Co
di

The above equatio
the neuron input p
spectrum, which w
trace.

5. F

- Adjust simulati
down to better
- Test optimisatio
best suit the pr
- Particularly lool
derivative-free