Modeling coherent slow-wave activity in the Drosophila central complex

(Extended Report)

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1 Testing Izhikevich Model

1.1 Normalizing σ of the External Current

Generally, if one changes the simulation step size, one should adapt the σ of the Gaussian white noise. The reason behind this is, that the variance of the Wiener process (or, Brownian motion) is:

$$var(W_{\Delta t}) = \Delta t$$

where $\Delta W(t) \sim N(0, \Delta t)$ For the scaled Wiener process ($X = \sigma W$):

$$var(X_{\Delta t}) = var(\sigma W_{\Delta t}) = \sigma^2 var(W_{\Delta t}) = \sigma^2 \Delta t$$

Now, let's Δt_1 be the step size and σ_1 be the standard deviation. Variance within the time unit equal to Δt_1 will be:

$$var(X_{\Delta t_1}) = \sigma_1^2 \Delta t_1$$

If we change the step size to $\Delta t_2 = k\Delta t_1$, then the variance within the time unit Δt_1 will equal to:

TODO 1. Finish Remark 1

□

Remark 1. For the simulations, the standard deviation was normalized with regard to the simulation step size ONLY for helicon cells.

TODO 2. Write the reasoning and reference the pictures