

1. T-Type channels

(a) First order kinetics

- We need data for deinactivation (no idea about the function to fit). Slow time constant is scaled version of $\tau_{deinactivation}$
- First order kinetics might be sufficient for our purposes

(b) Fitting Jeong 2015

- (2.2.1) Fitting steady state inactivation/activation: I doubt that they scaled activation, so I assumed, that they plotted m^3 for activation
- (2.2.2) m^3 dynamics for activation is also indicated by the time constant of tail currents (apart from similar models in the literature). Time constant for one gate will be three times slower, as the deactivation will occur if any of the three channels is deactivated. Three times tau deactivation at -50mV is approximately equal to tau activation at the same test potential.
- Took values for deinactivation from another paper. Currently modelled as the discontinuous jump at -50mV. But this might be not very good approach (will be important when I move to the neuronal model)

(c) Current

- I-V relationship should be important to have biologically plausible model. Especially for the T-Type current, as the bursts lay on top of them
- Ohmic current cannot reproduce I-V relationship correctly. Switching from Ohmic current to Constant field equation did better job
- This was described in one of the papers. Was also true in our case
- I assumed that I-V in Jeong 2015 is transient I-V (not steady state). It was not explicitly mentioned what they plotted, but from the text it seemed so.

(d) Need to scale gating functions

- Patch clamp in Jeong was done with 10mM Ca^{2+} concentration. In drosophila $[Ca]_o$ is 0.5mM
- The gating variables depend on the Ca^{2+} concentration outside membrane
- Here I only fit m_∞ , τ_m (using function 'curve_fit' to fit the IV relationship). Generally, other variables might need shift, but I am not sure whether it is a good idea to use 'curve_fit' instead of correcting them based on the literature.

2. Model

(a) Wang 1994. Idea - start simple \rightarrow make more complex: What are the main components?

- Resting membrane potential is at -60 mV (instead of -49mV as in R5)
- h-current is not necessary for LTS (generally, removal of h current did not change much in the presented set of parameters)
- Block Na channels results in LTS, but amplitude is \sim 40mV
- Authors specifically set persistent sodium to drive postinhibitory rebound spike (Na spike). Without it neuron will not reach spiking threshold
- If one does not block potassium channels along with sodium ones, HH-type I_k takes over LTS and Ca spike is not visible.