QLSC 600
Cook Assignment 1: Model an H&H-like current

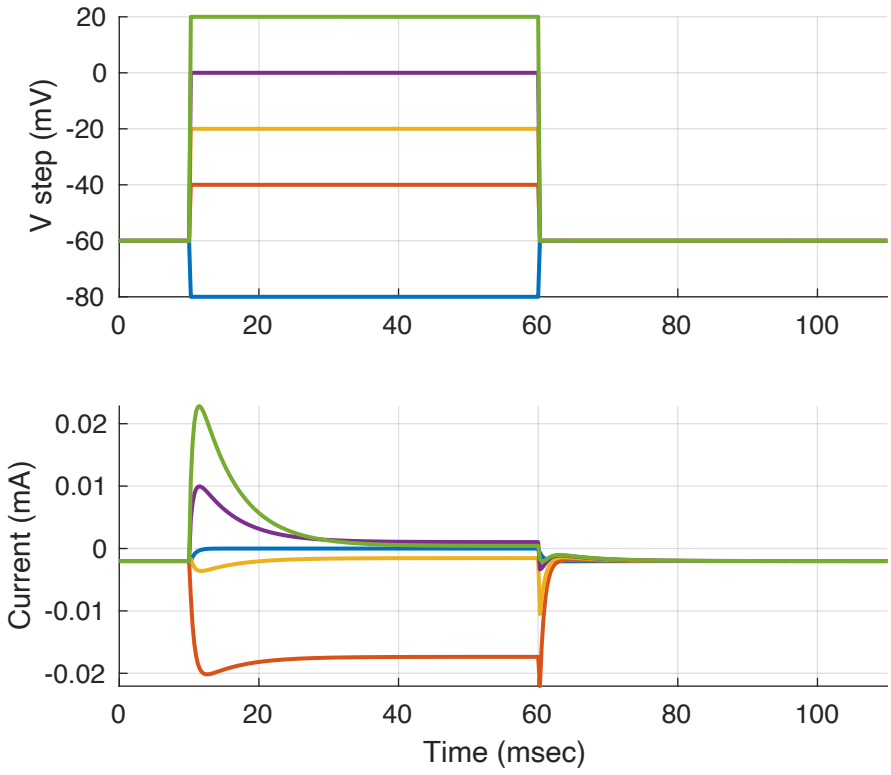
In this lab you will construct a Matlab model of a voltage- and time-dependent current. The goal is to use the H&H formalism to mimic the voltage-clamp response of an unknown current.

Load the voltage-clamp data

Load the data file:

load('CookAssignemnt1UnknownCurrent.mat')

Three variables will be created: 1) Time in ms (t). 2) The time-course of the voltage in mV (vStep, a matrix of 5 different steps where the rows are time and the columns correspond to each step). 3) The current in mA (iUnknownCurrent, matrix of the current in response to each voltage sweep).



Using the H&H formalism presented in class, construct a Matlab model that takes each voltage-clamp sweep as an input and produces a current as the output

Adjust the parameters of the model to best mimic the unknown current.

If desired, model parameters can adjusted by hand.

Hints

You may assume that all taus are constant, and that all activation variables have no exponents.

The reversal potential for this current is -15 mV.

What to hand in

All files should be in a single compressed folder named *teamName_CookHHLab1* and include:

1) Statement of work listing your collaborators and the contribution of all collaborators.

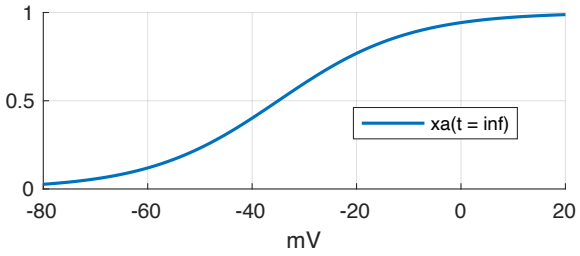
2) A PDF file of a plot similar to that shown below which includes all the components of the model and lists the parameters. The plot should also show the current traces of the data (solid) compared to your model's current (dashed).

3) All the code used for the model.

Grading

50% for constructing an appropriate model that runs.

50% for the ability of the model to mimic the data.



gBar = 0.0005 mS
Er = -10 mV
taua = 10 msec
v0a = -35 mV
ba = 0.08