Step current responce of the HH Model

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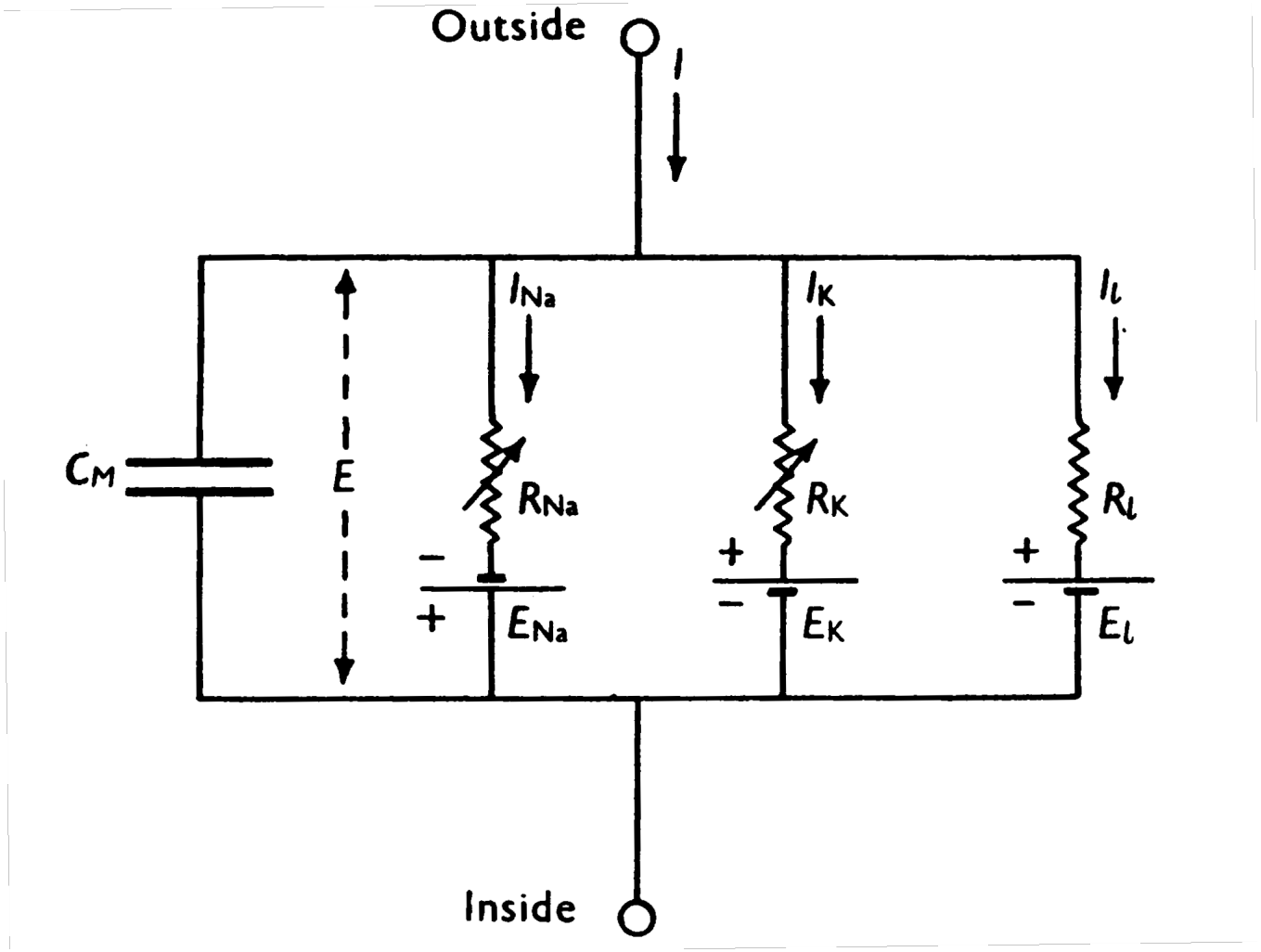
November 20, 2014

A constant current applied to the HH model produces a train of action potentials.

The HH Model



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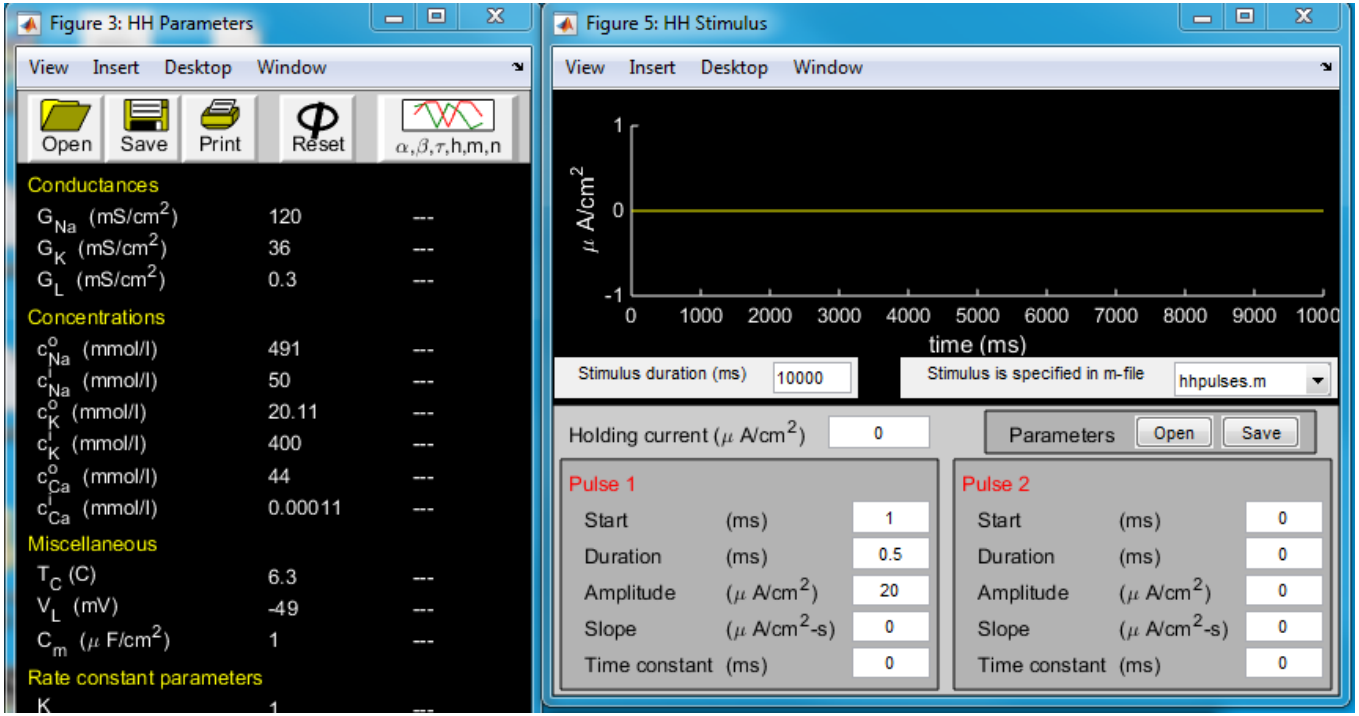
Simulation Software



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Three possible responces to a step current

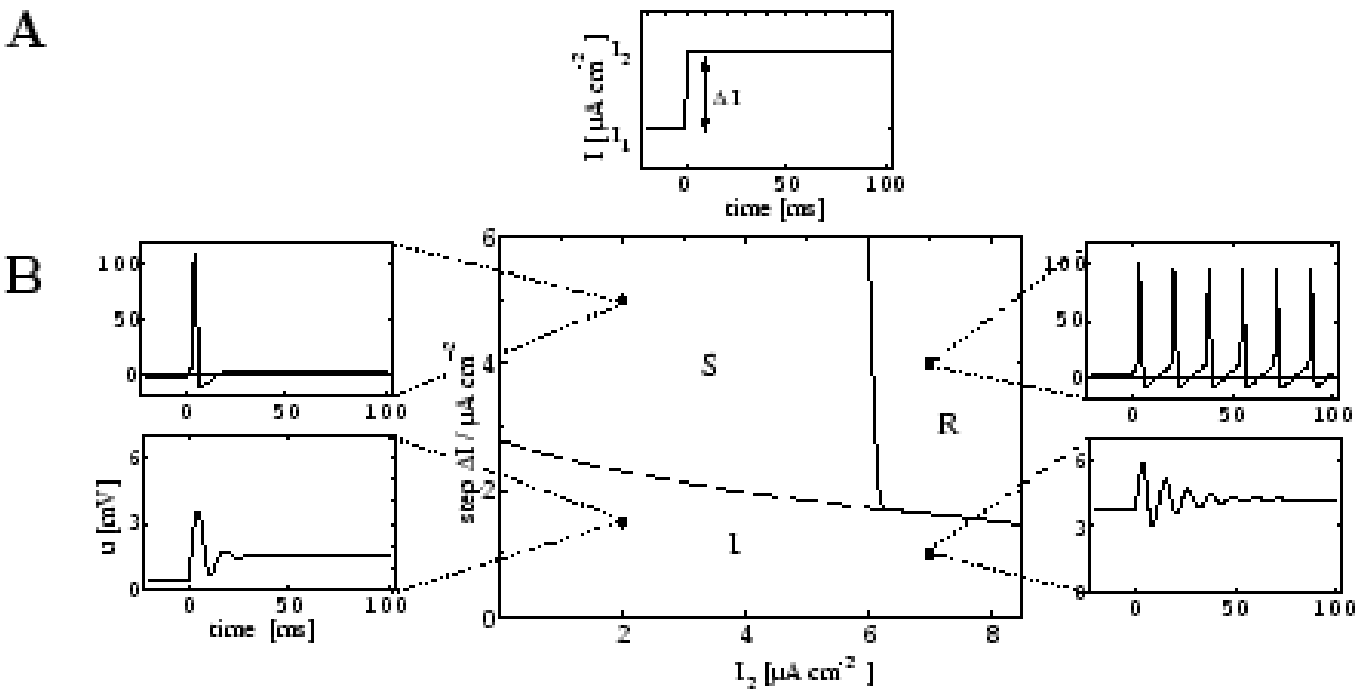

Figure : Phase diagram for stimulation with a step current.

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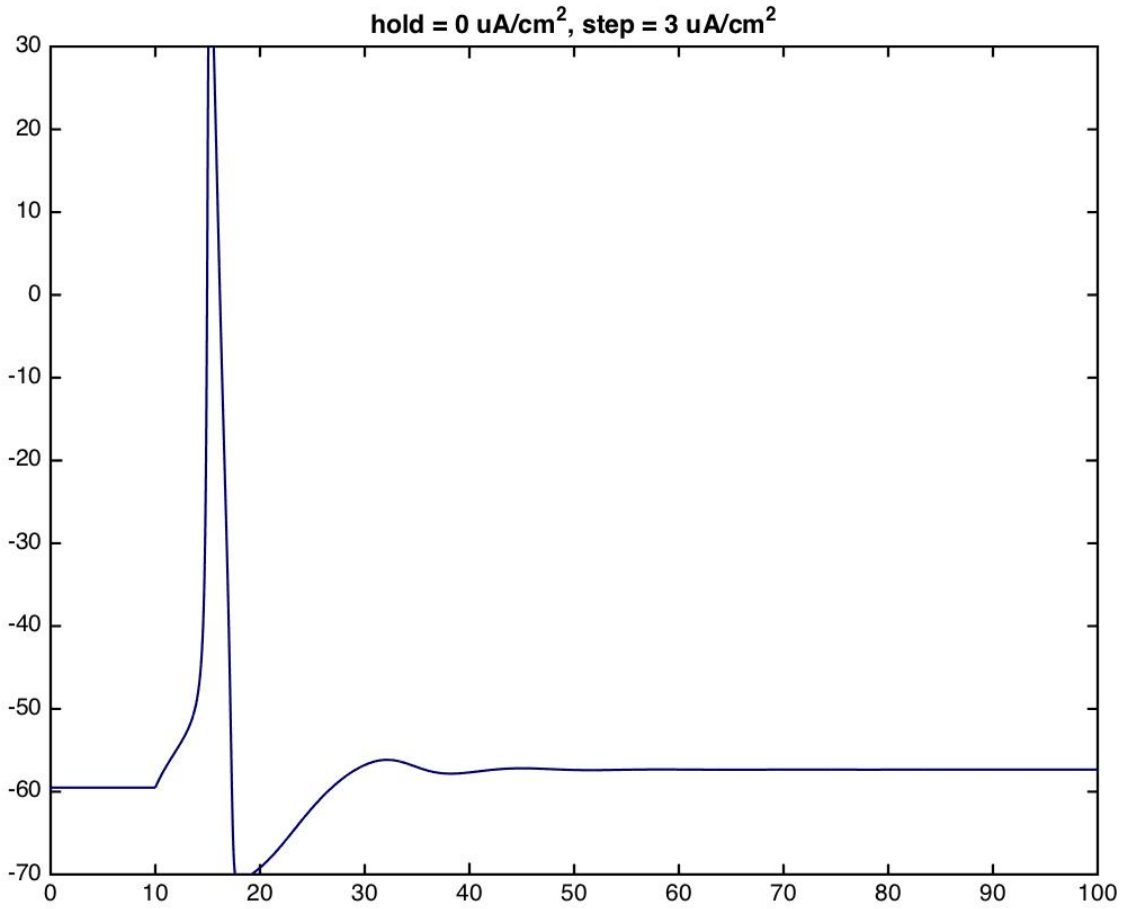


Figure : Simulated single action potential.

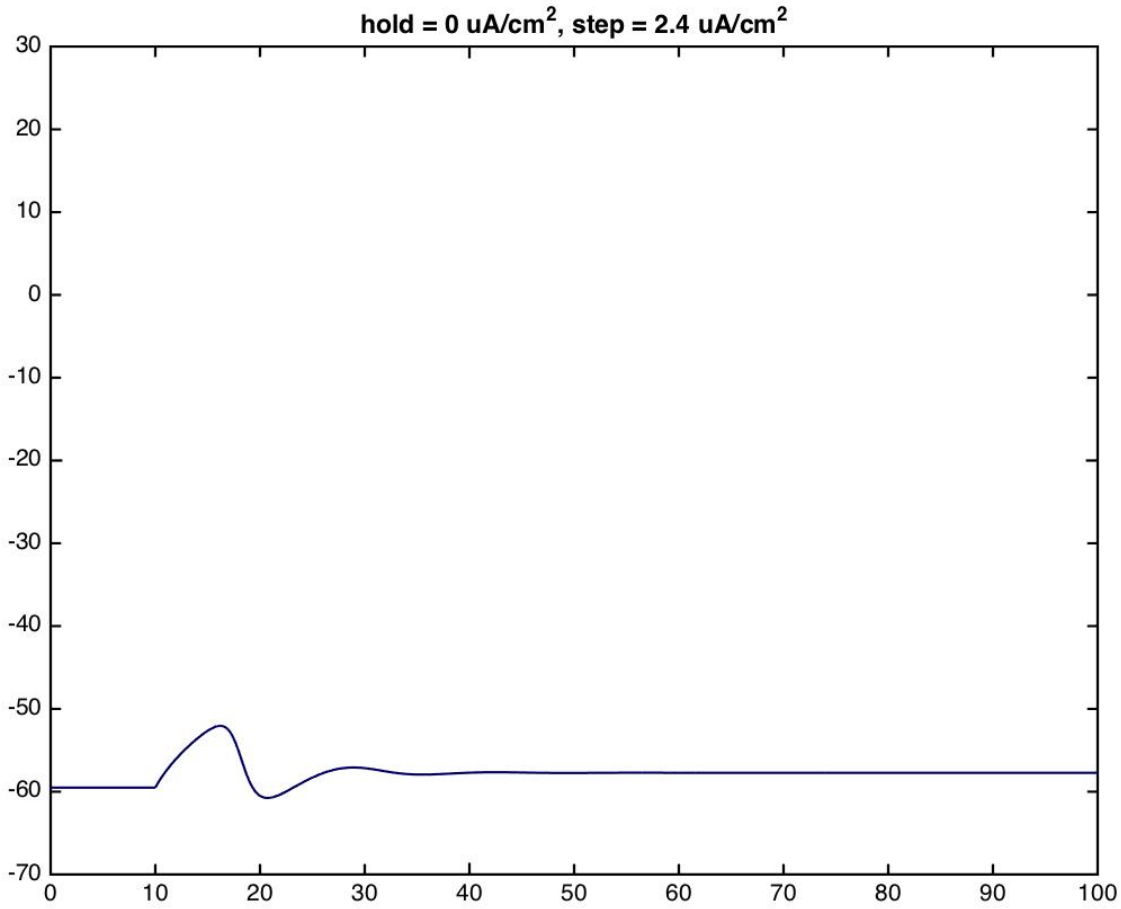


Figure : Simulated ringing response.

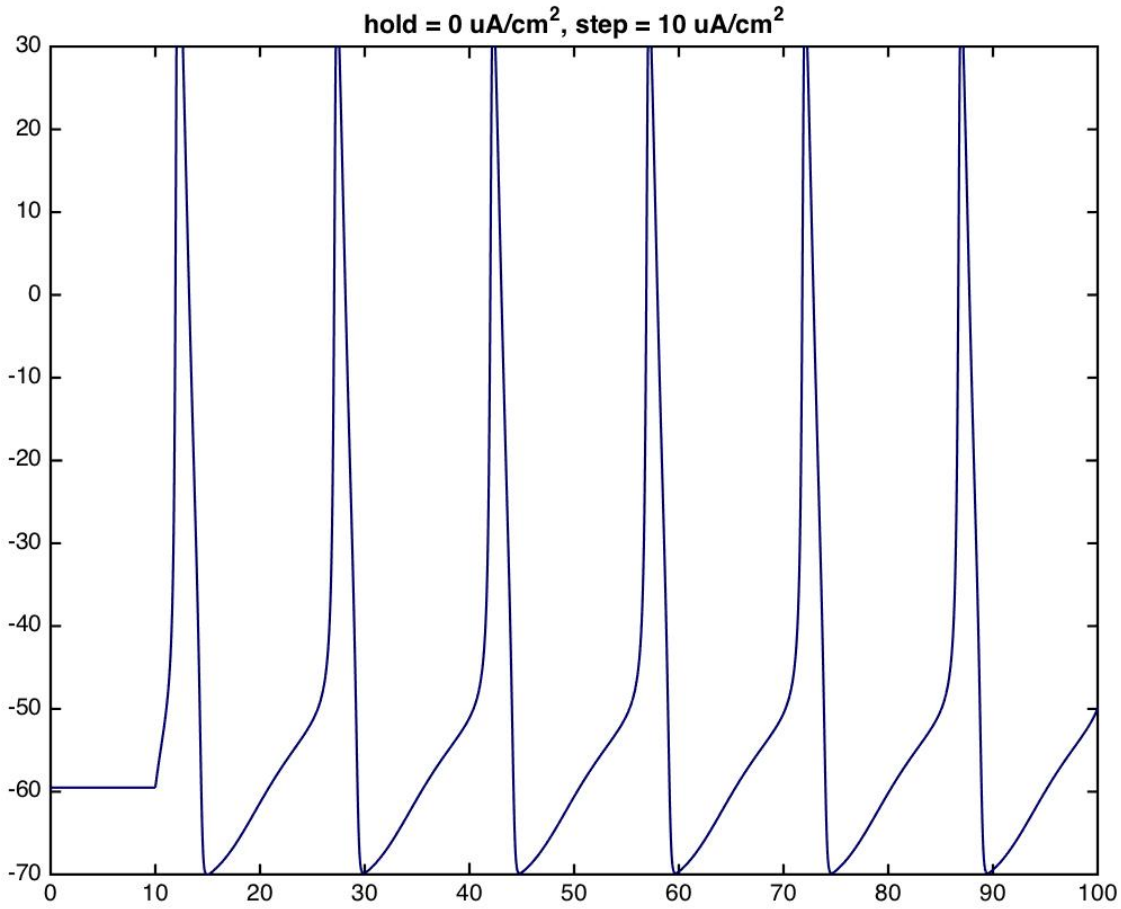


Figure : Simulated train of repeating potentials.

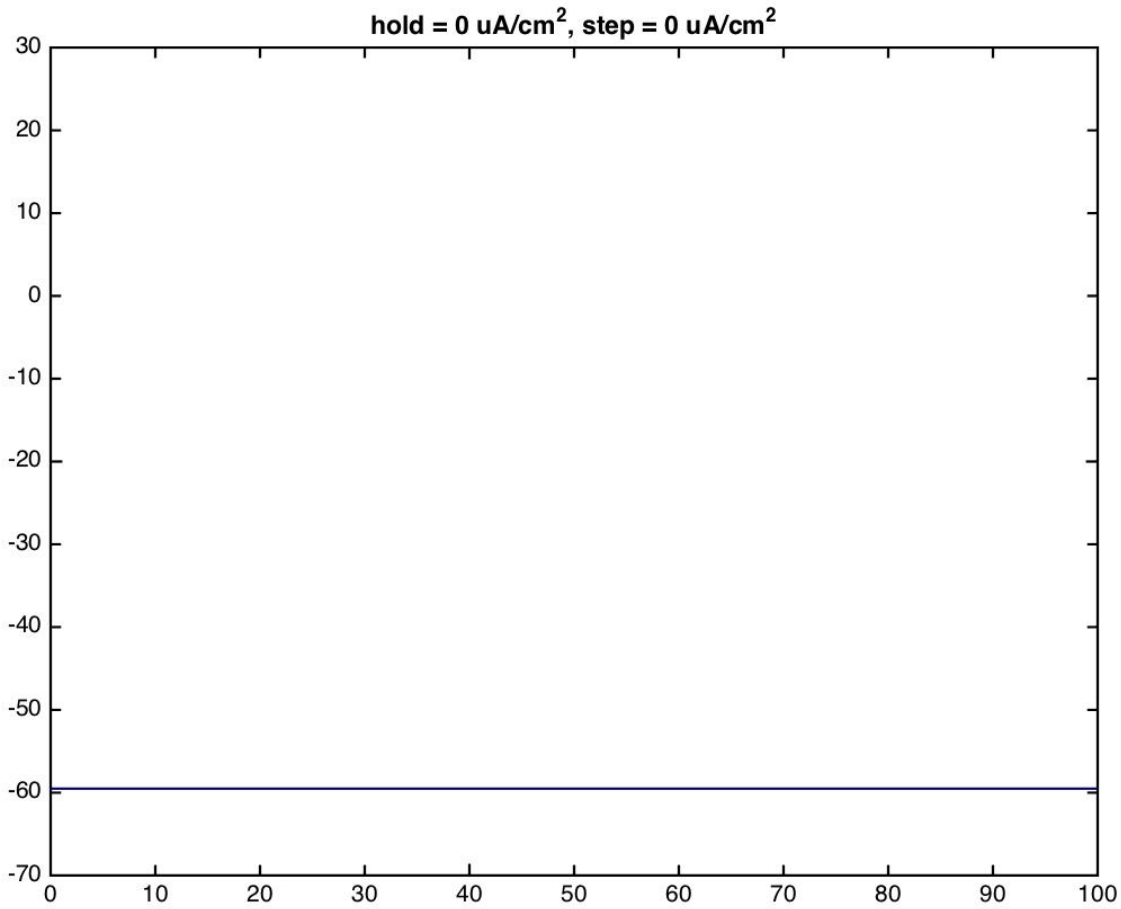
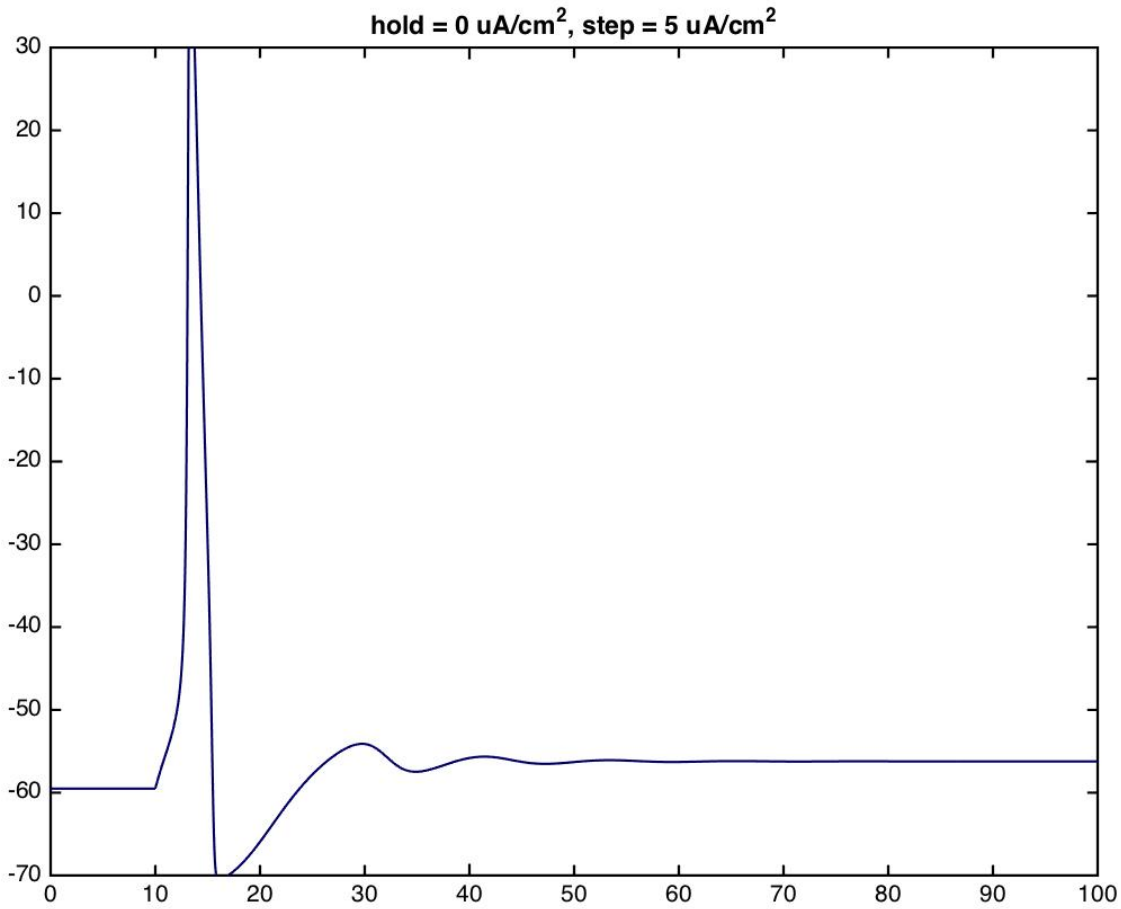


Figure : HH Models step current response starting at 0 $\mu A/cm^2$



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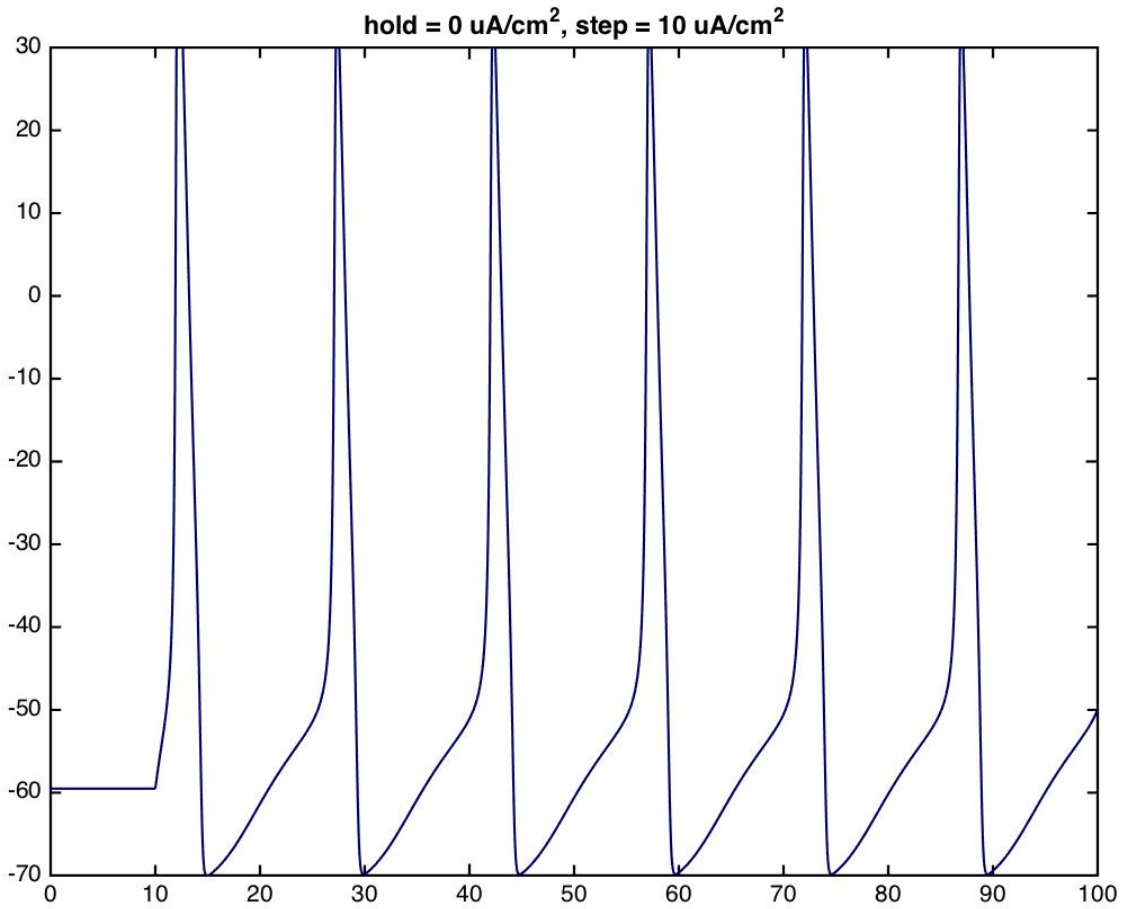

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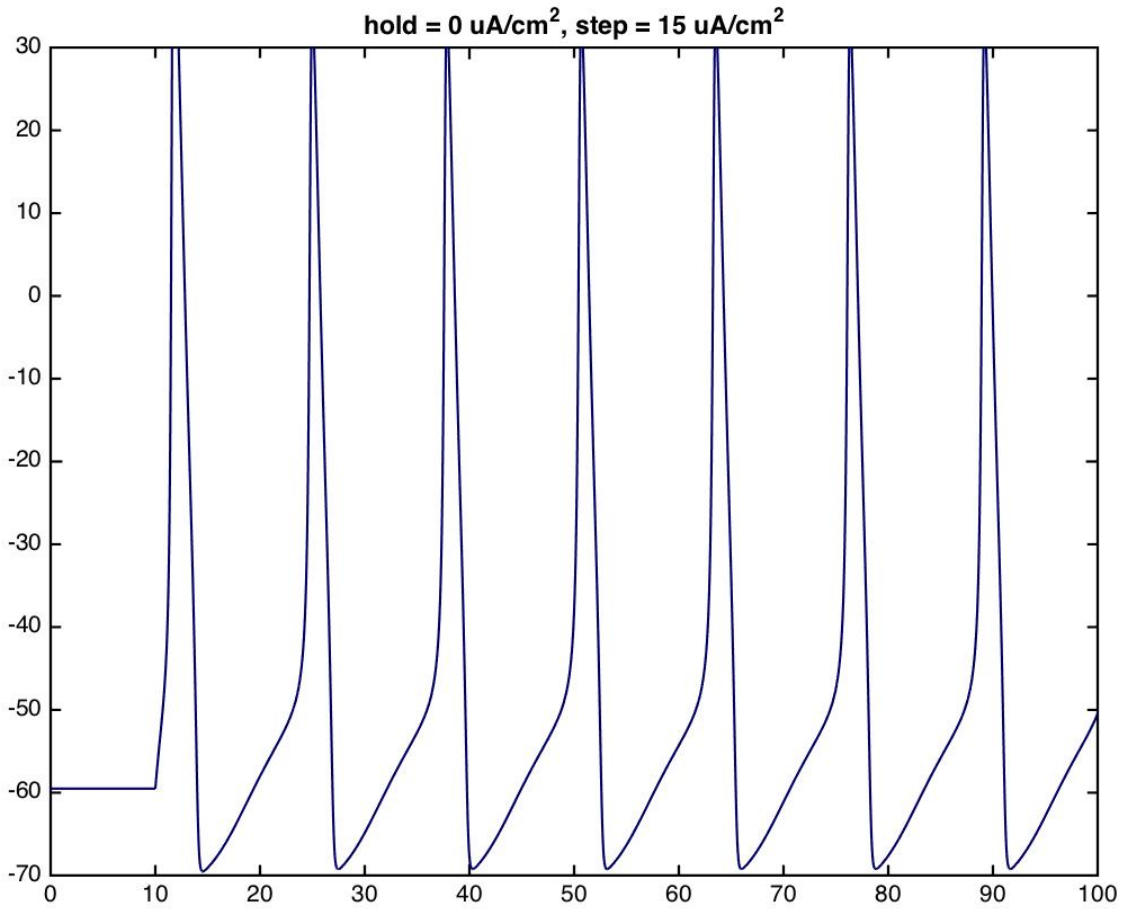

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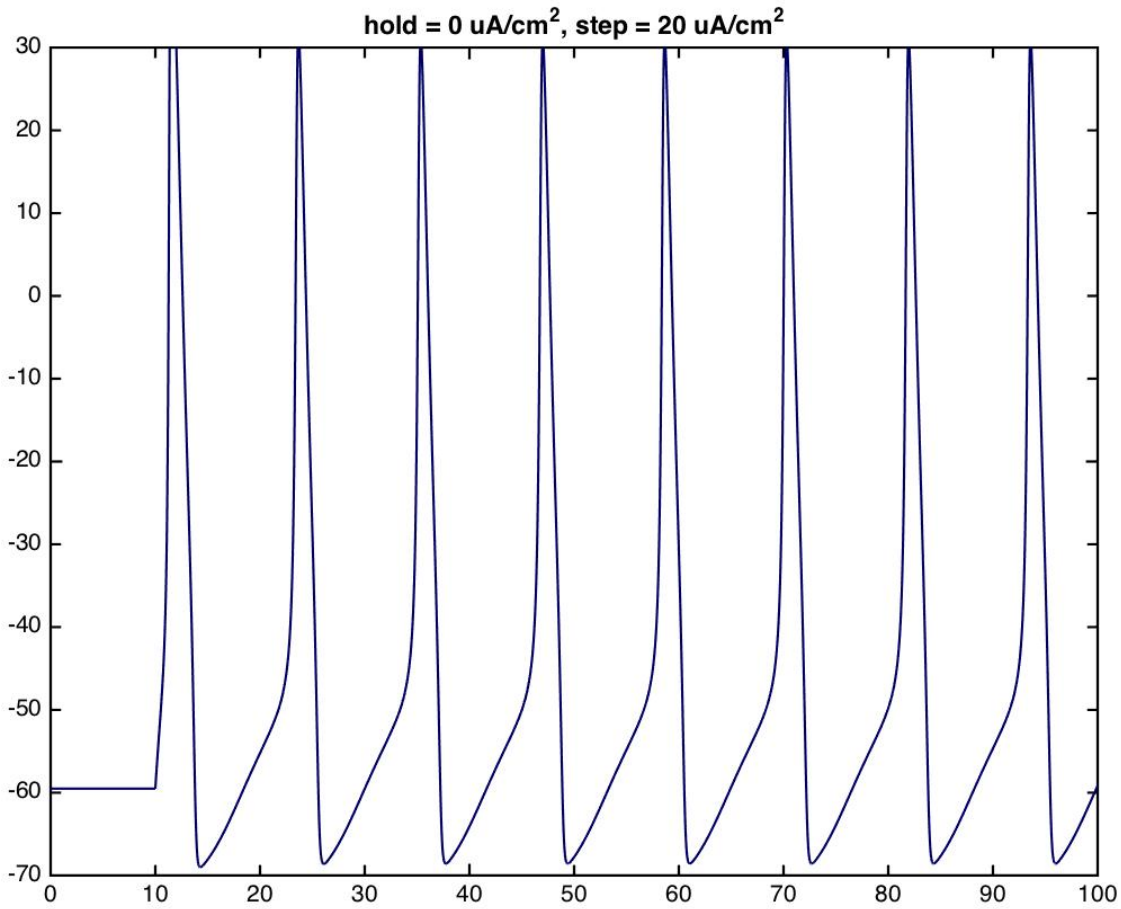

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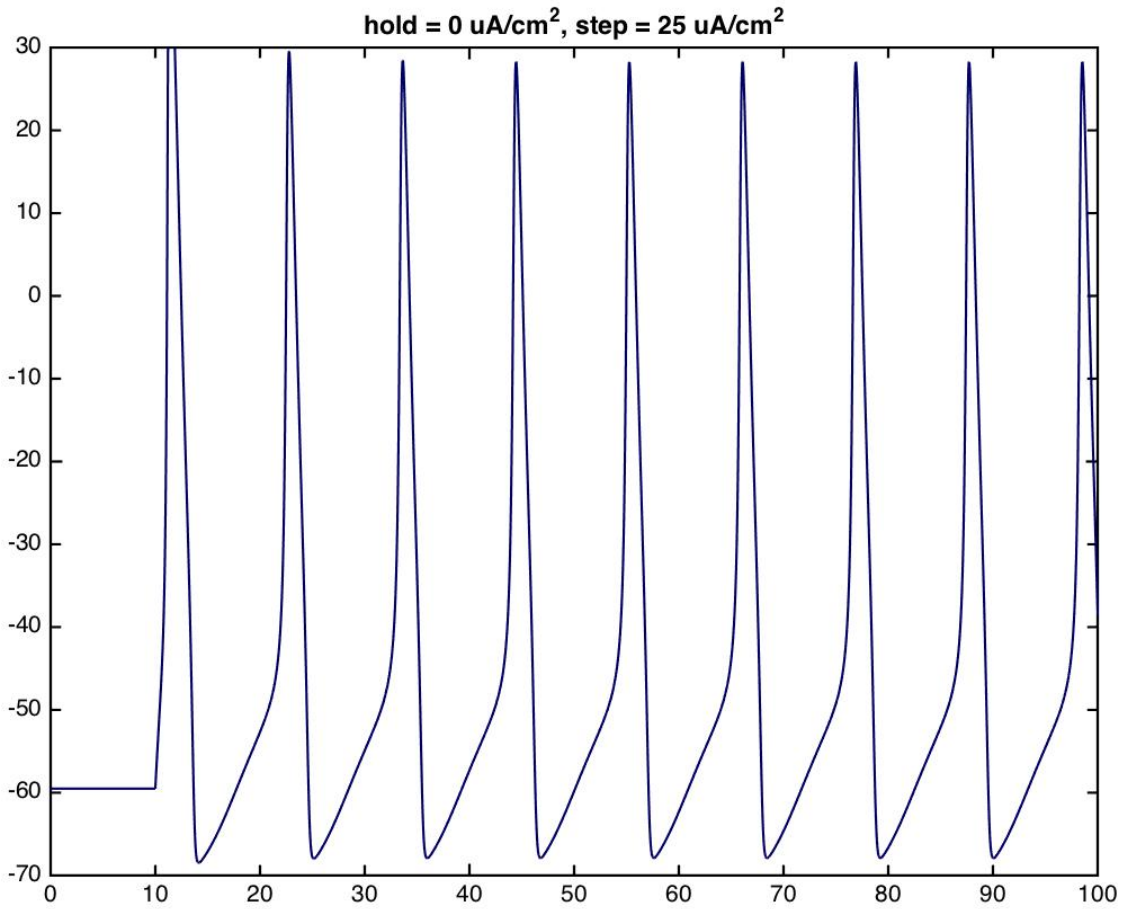

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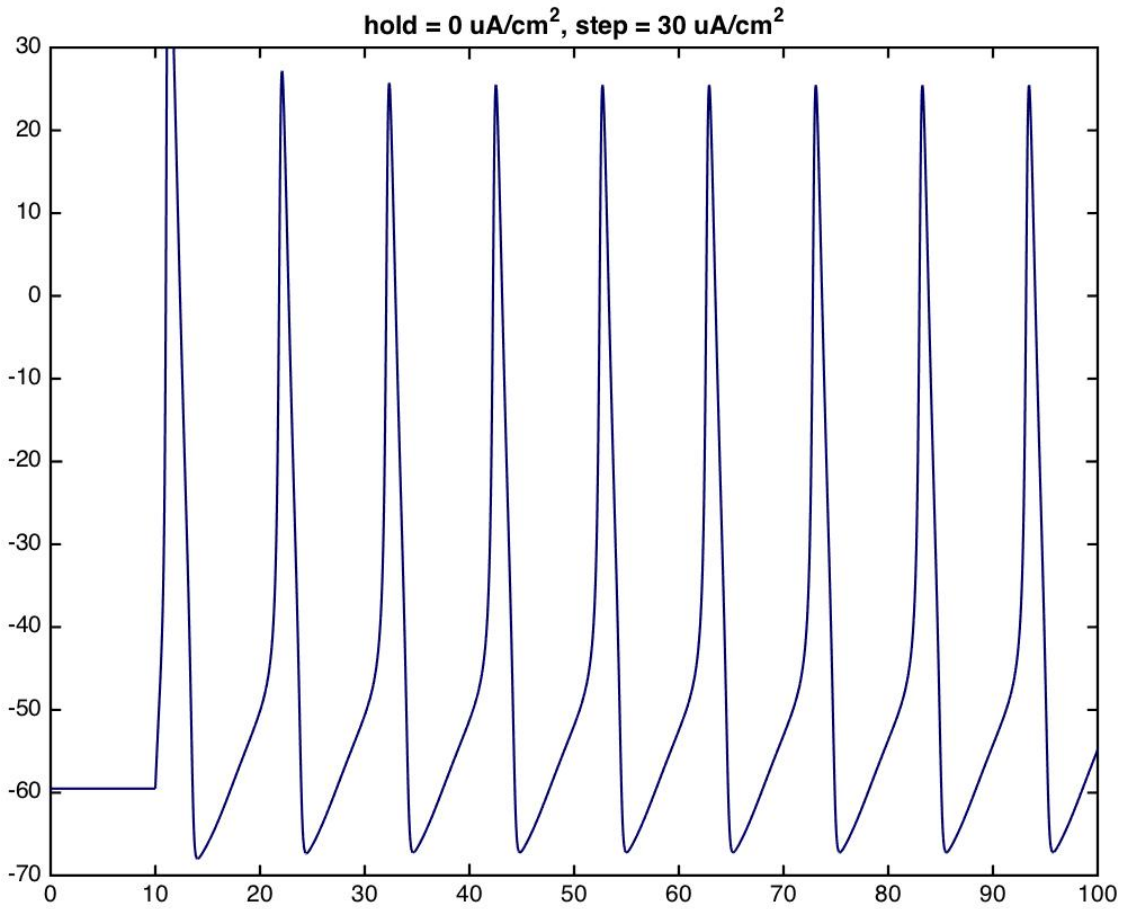
A constant current applied to the HH model produces a train of action potentials.



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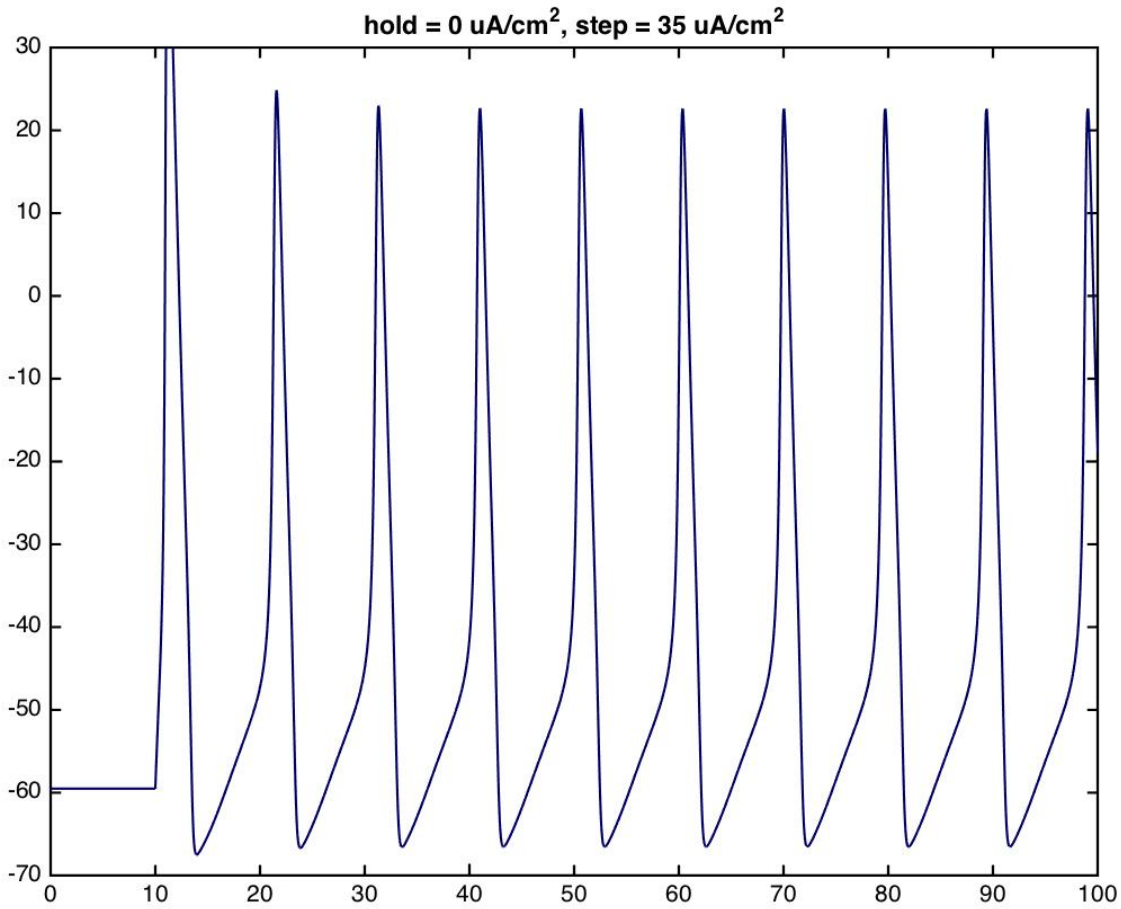

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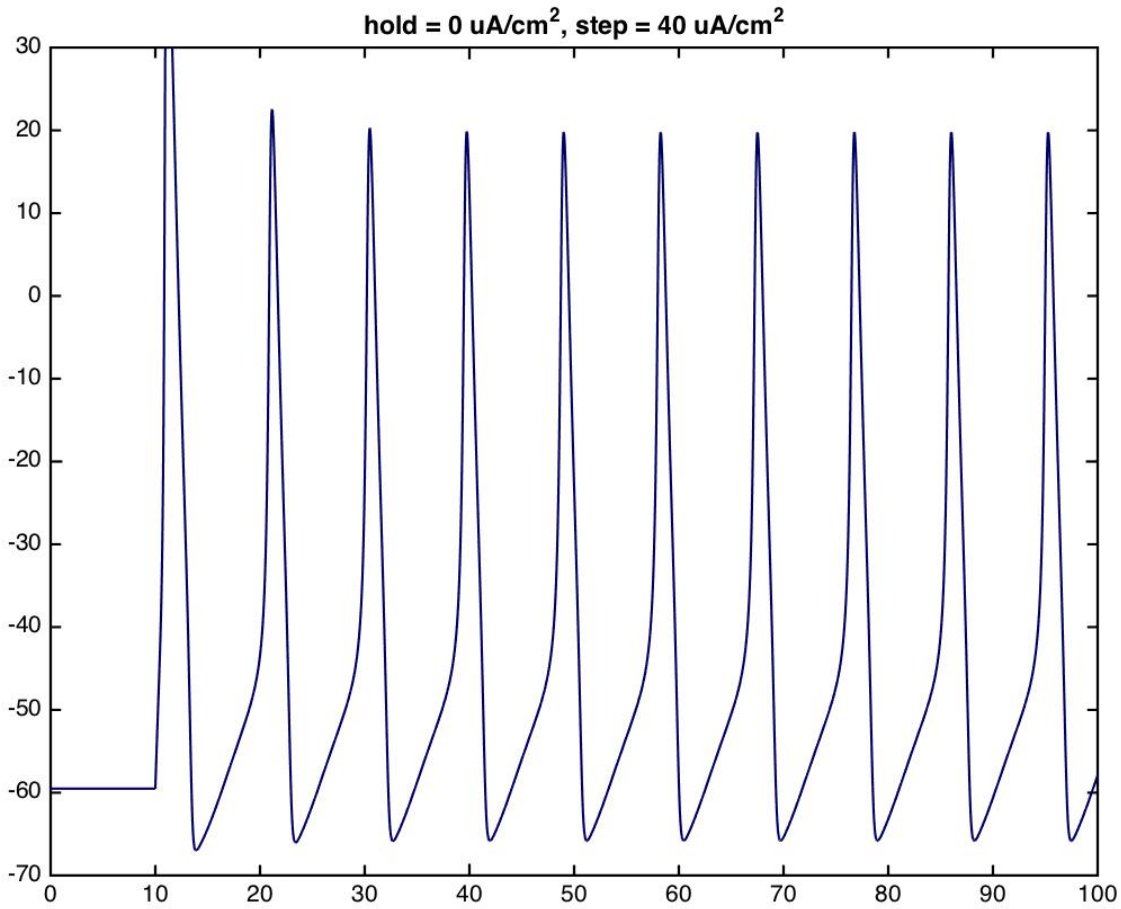

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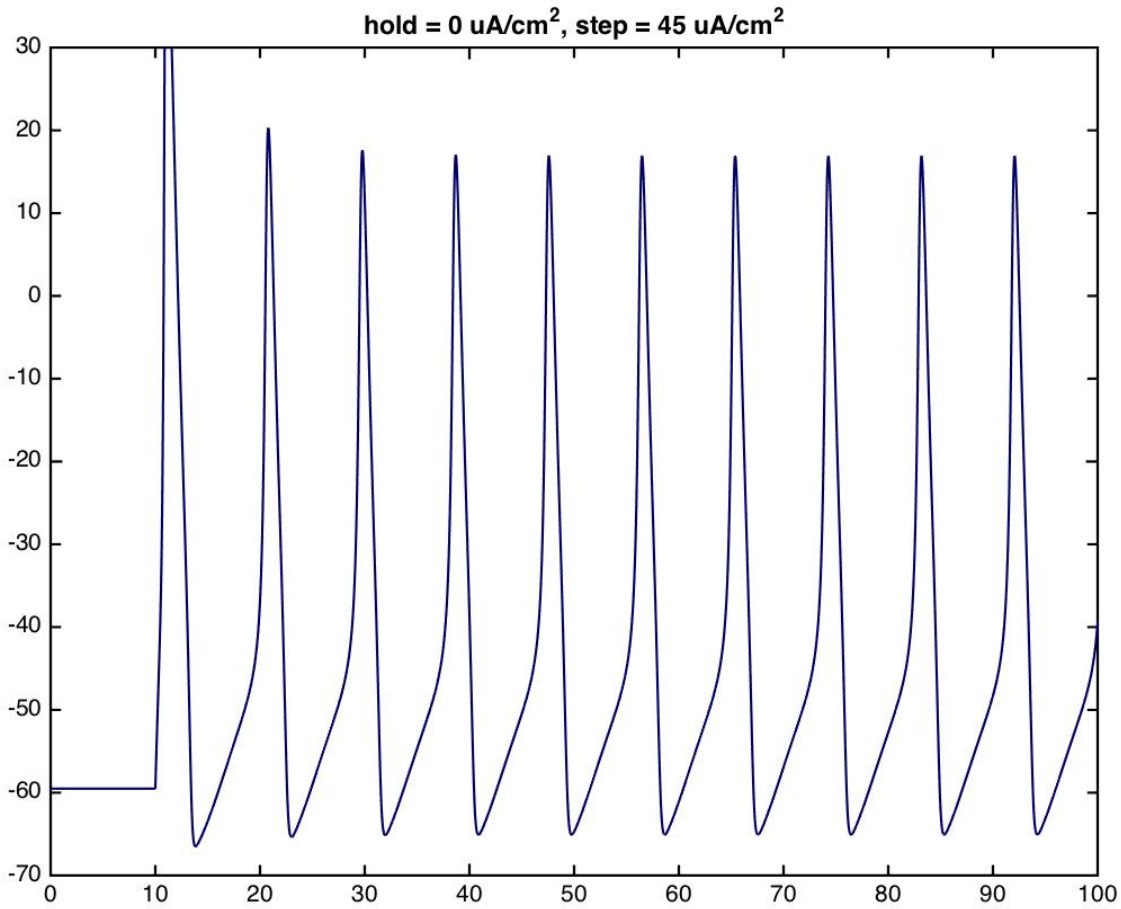

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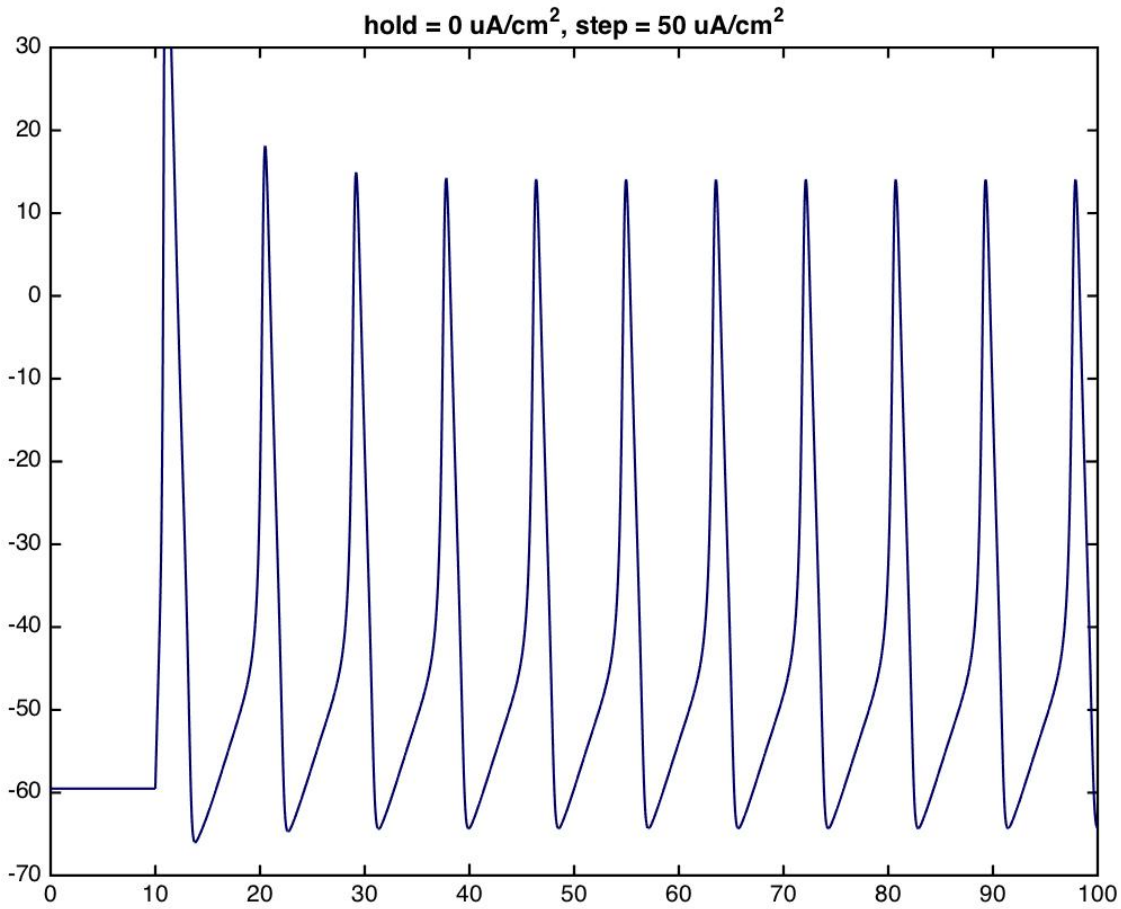

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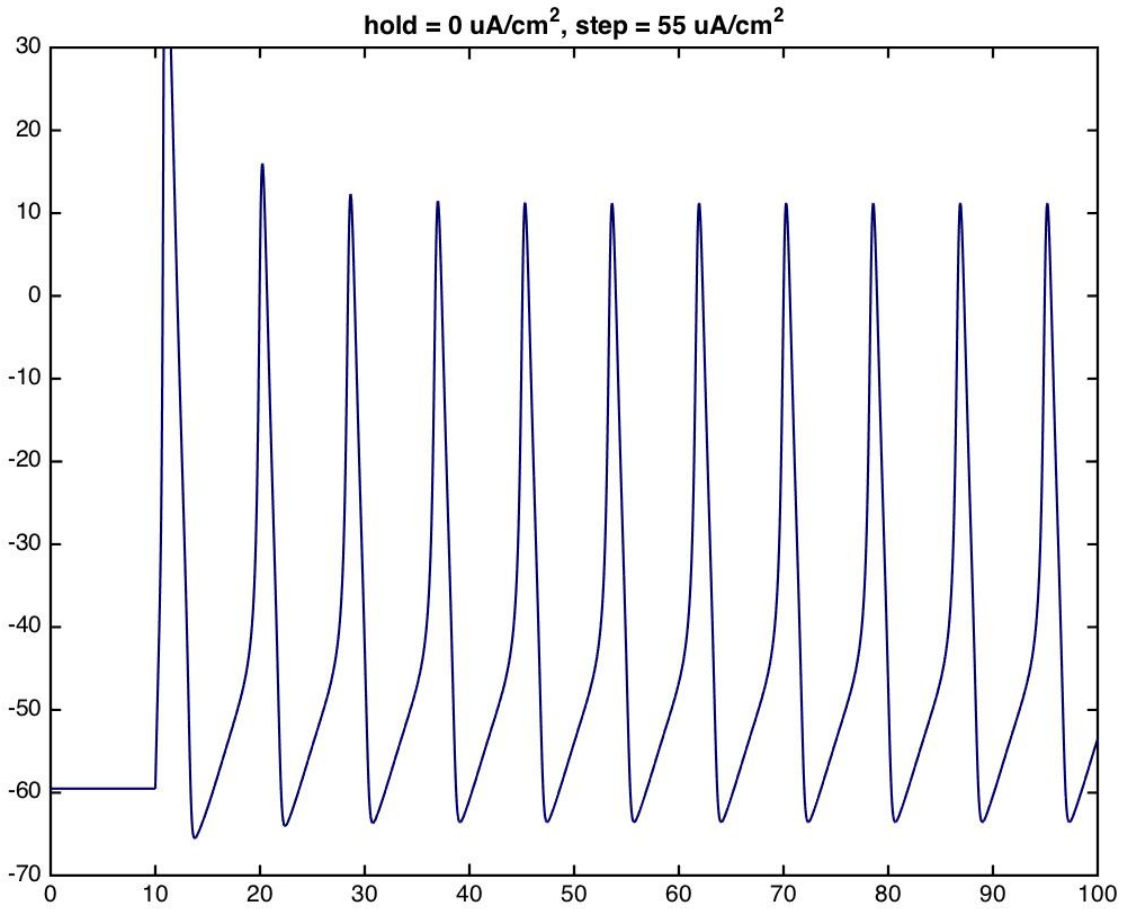

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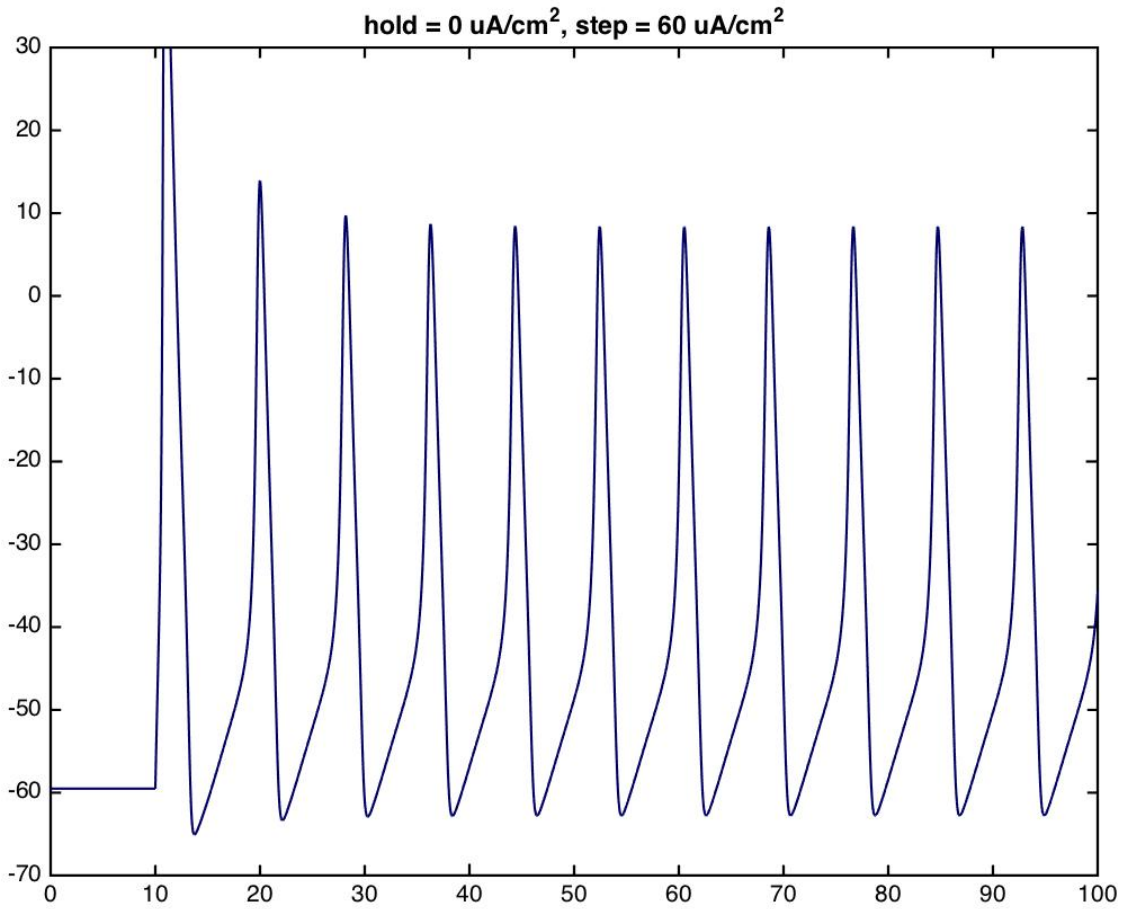

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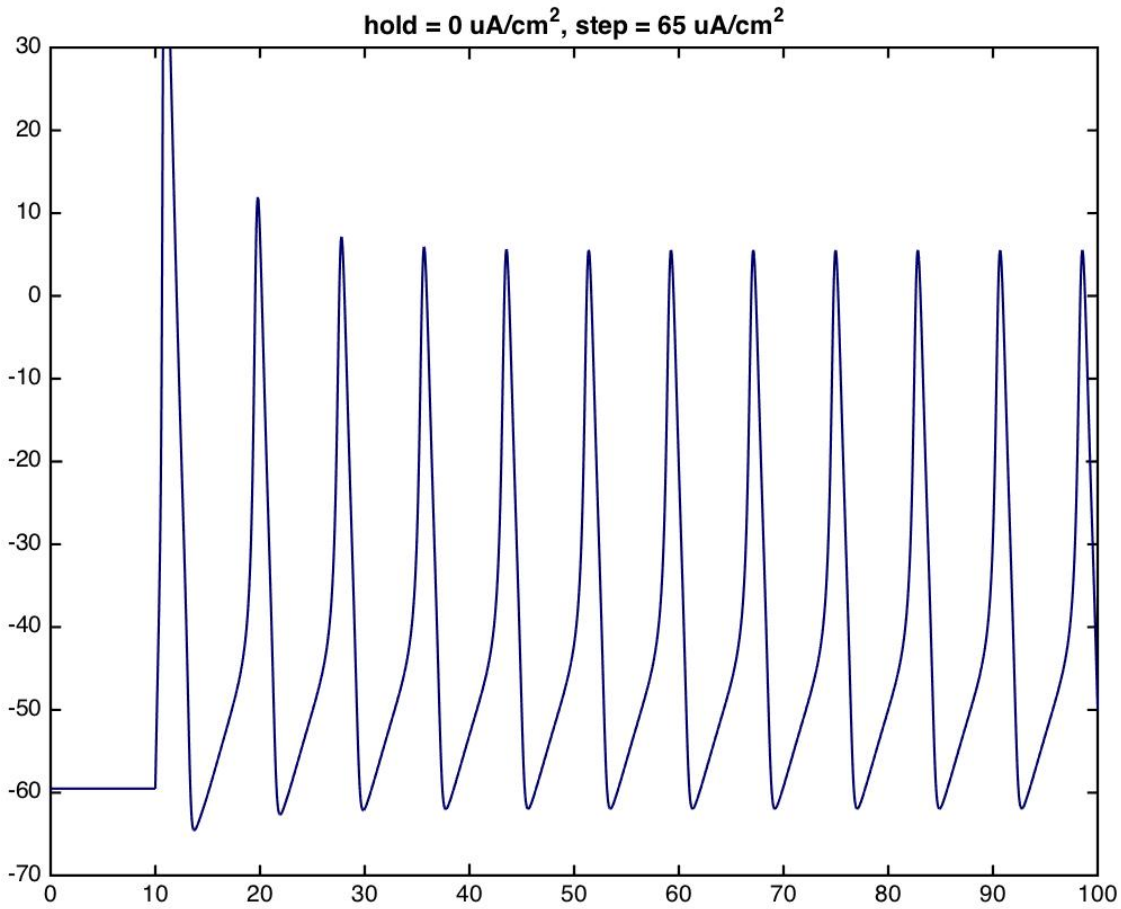

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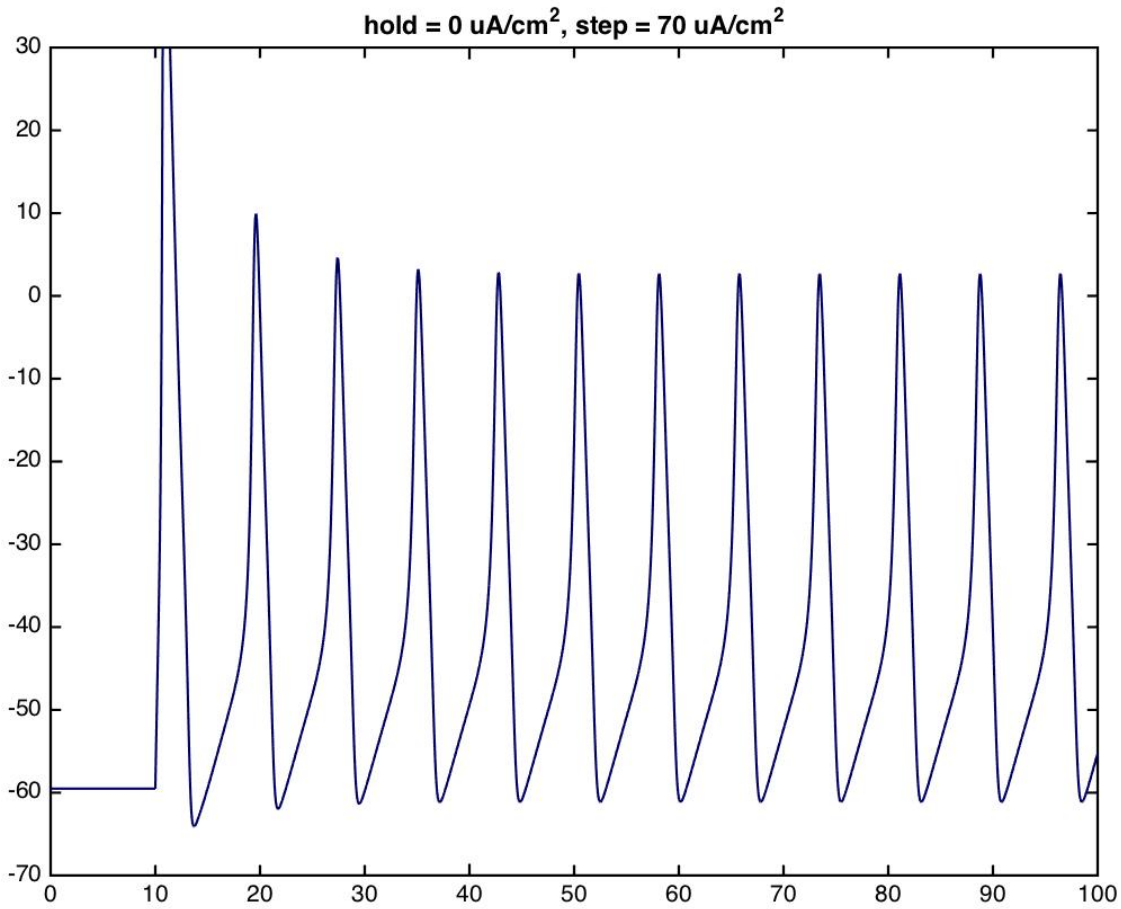

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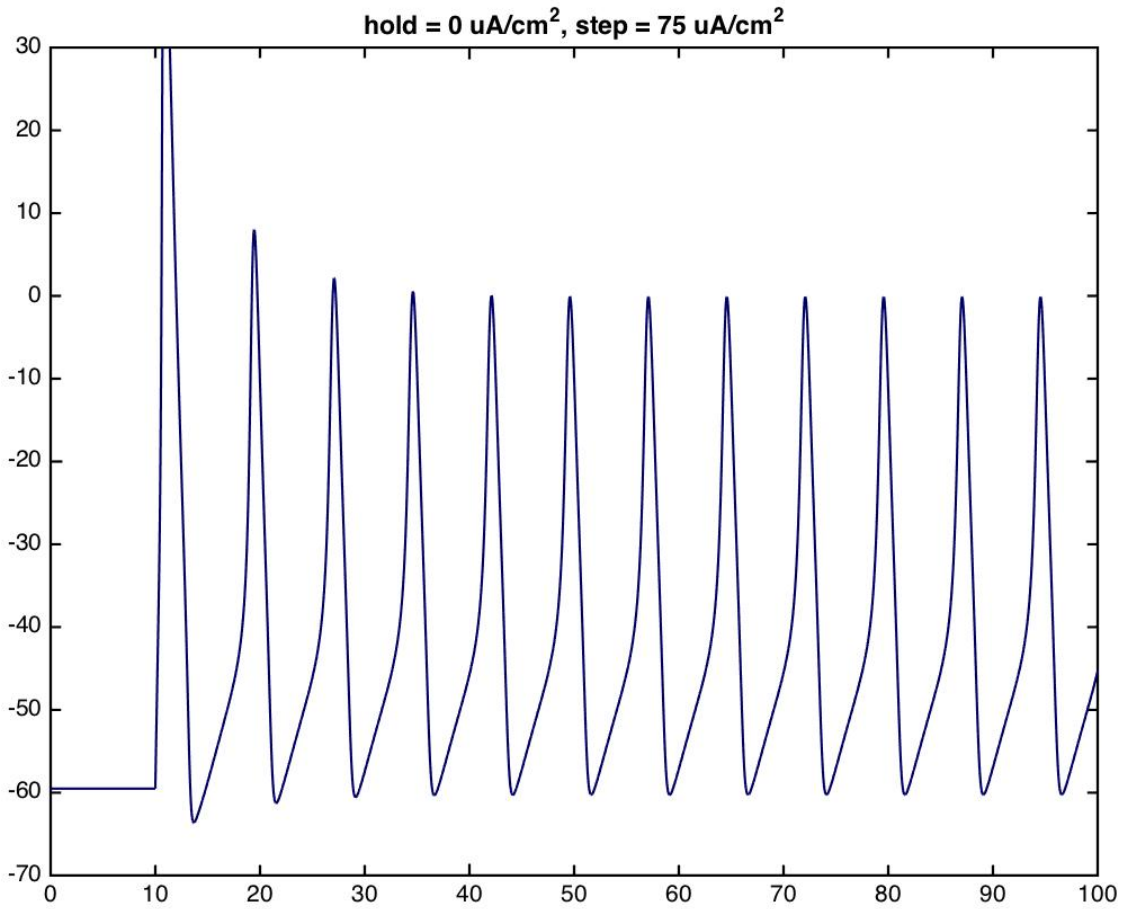

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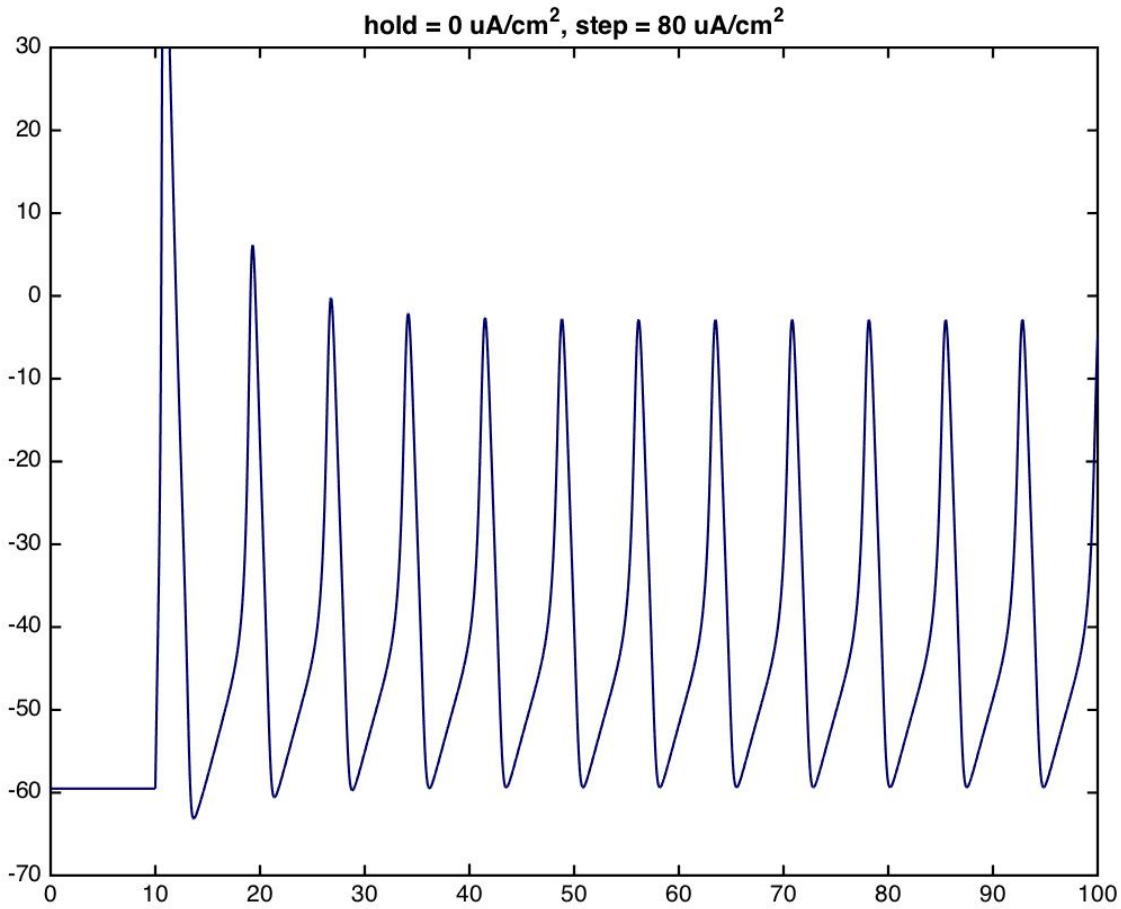

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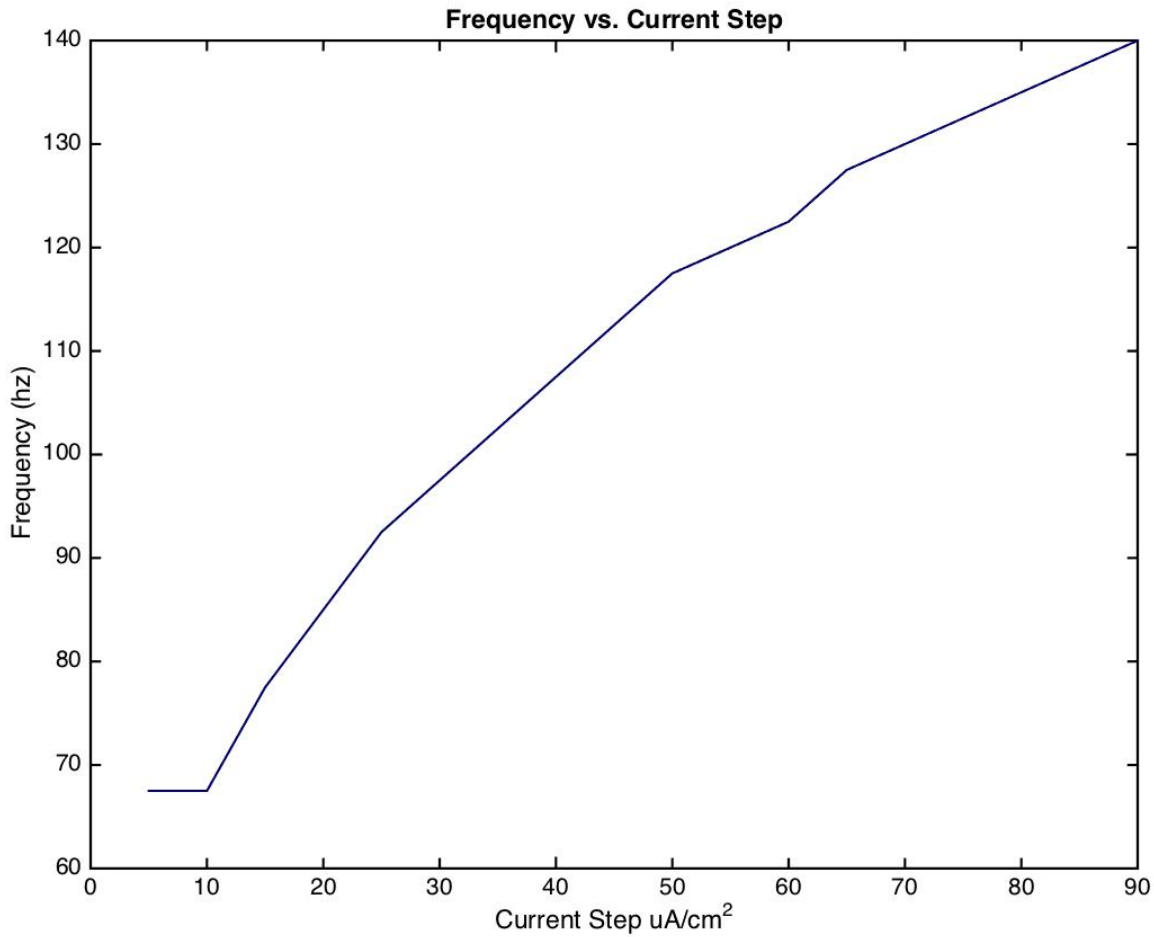
Finding train frequency; LSSA

To find the train frequency we used the Least-Squares spectral analysis method (LSSA). LSSA is a method of estimating a frequency spectrum, based on a least squares fit of sinusoids to data samples, similar to Fourier analysis.

It works *better* than Fourer Analysis on data with variable time intervals such as the ones we are studying.

Train frequency over increasing input step



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Issues with precision approximation

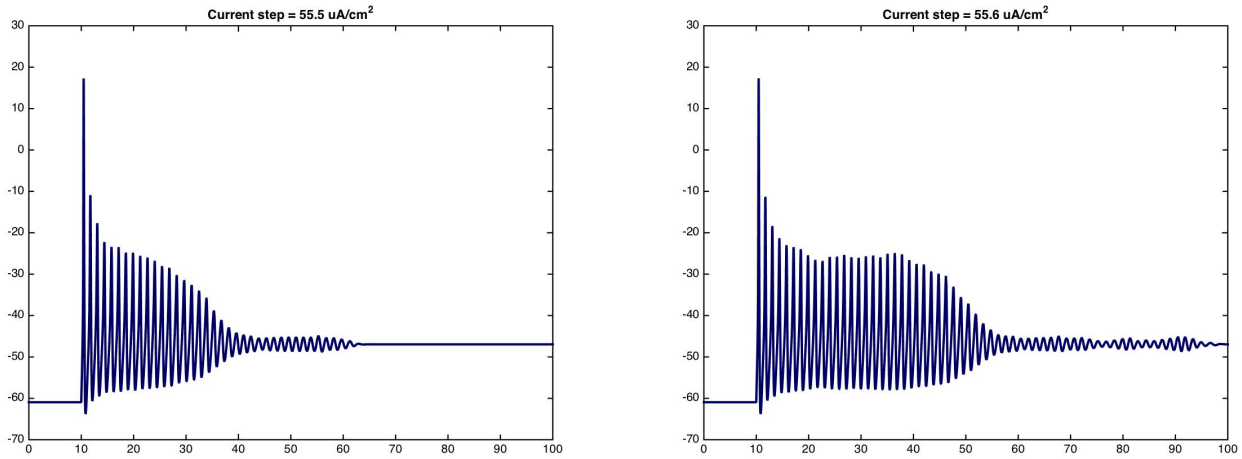

Figure : Incorrect behavior due to low precision

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References

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2. Weiss, T. F. (1995).Cellular Biophysics. Volume 2: Electrical Properties, MIT Press.
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