University of BRISTOL

GPR on non-trivial data

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Week's work

- Redraft the continuations paper
  - Done, but I want another full read
- Test GPR on various different cases
  - Different models
  - Stochastic and deterministic simulations
  - Many and few datapoints
- Other stuff: tidied up my assortments of codes

Stochasticity

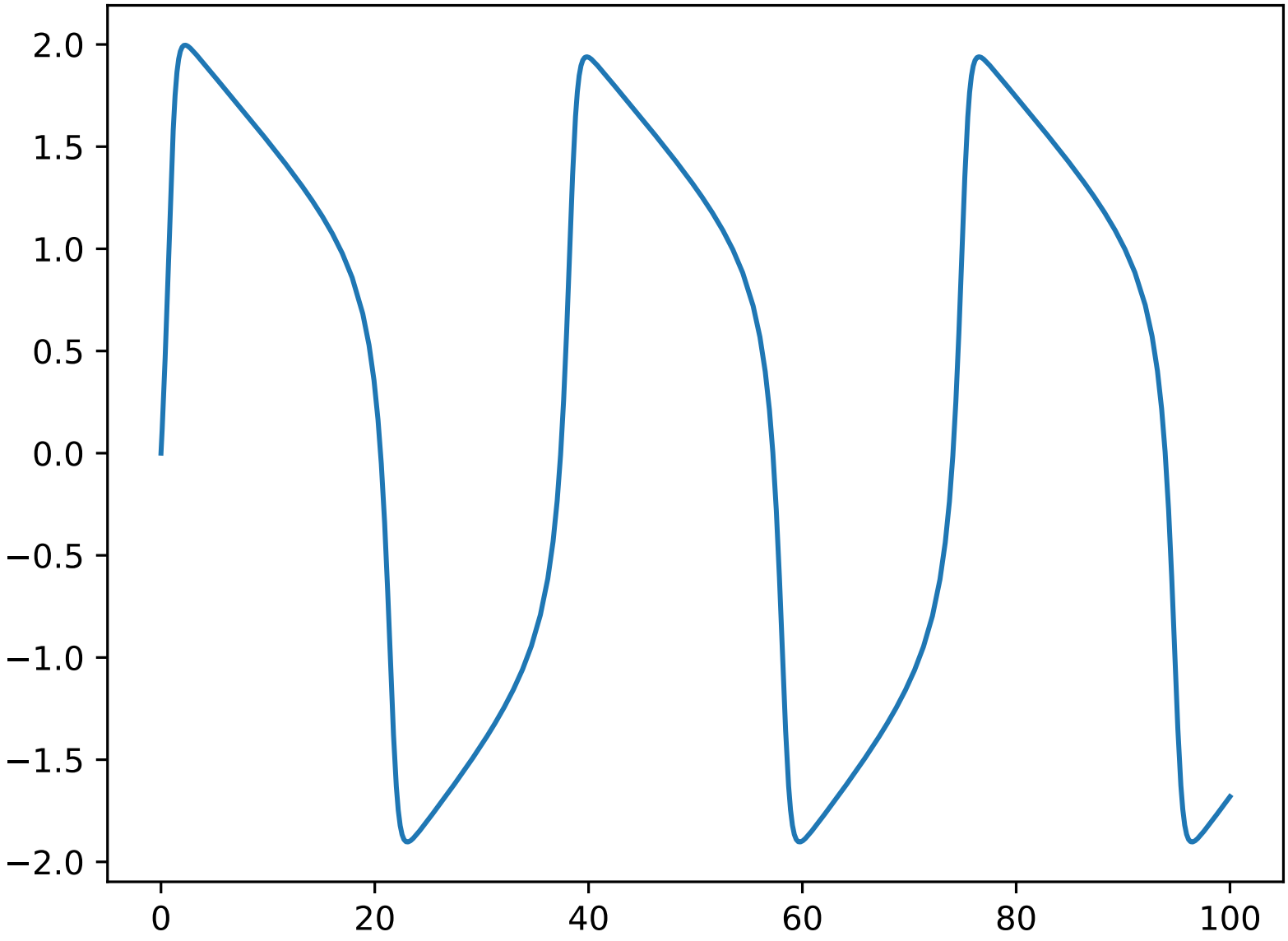
- Looked into stochastic neuron models
  - They're hard – requires stochastic calculus, stochastic integrators, etc., which I don't know anything about
- Produce all sorts of non-trivial dynamics
  - Stochastic and coherence resonance
  - P-bifurcations

- Very interesting area, but also another can of worms
- Suggestion: test GPR on deterministic models + noise, then move on to stochastics
  - Start reading a stochastics textbook?

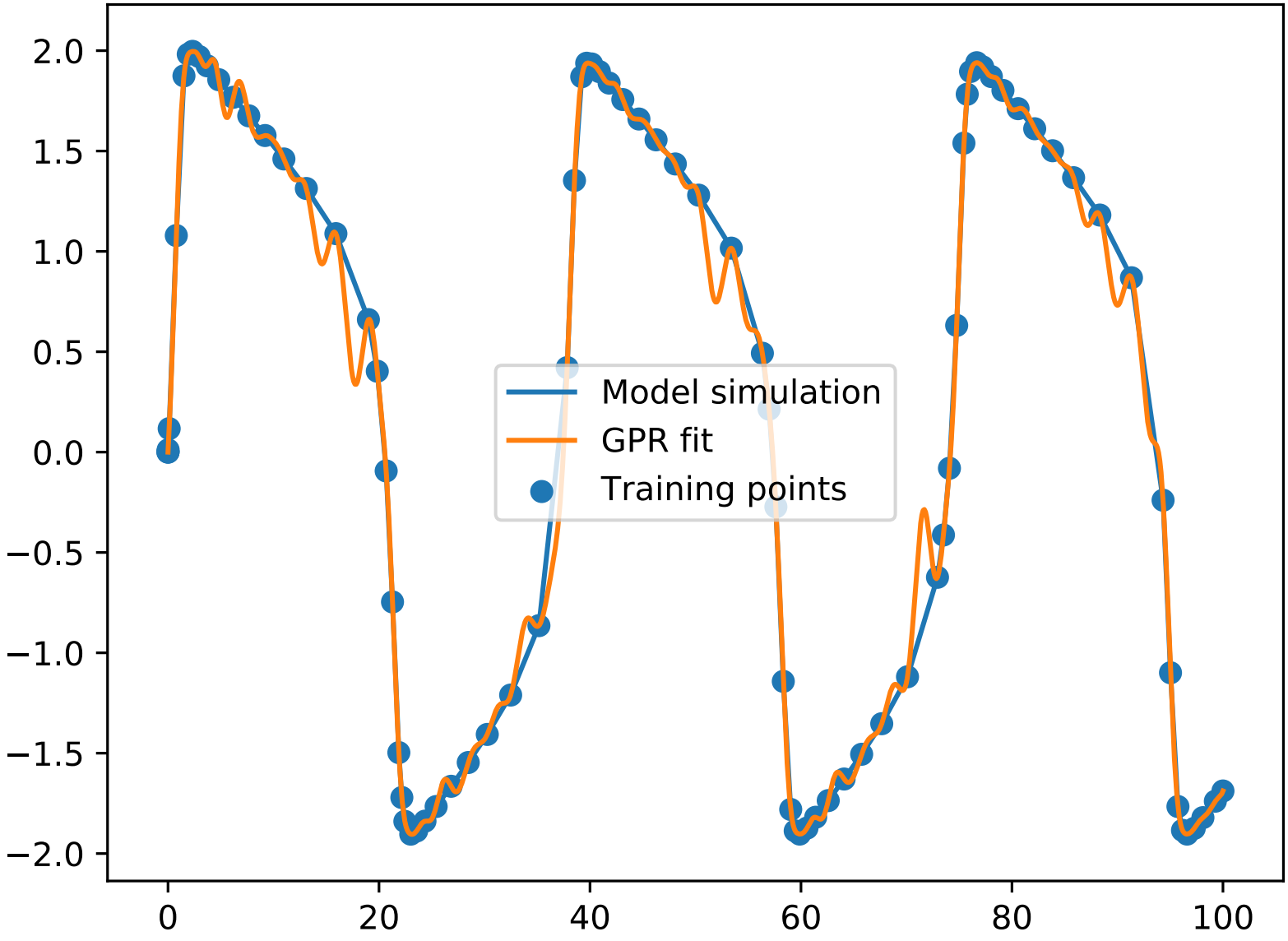
GPR testing

- Set up a script to generate lots of neuron simulations *[next slides]*
- Working on adding in the simpler kernels I've been playing with
- Goal: test...
  - four models (FH, HR, HR fast, HH)...
  - with three kernels (SE, modulo, cosine)...
  - with and without noise
- 24 different cases
  - The code structure makes it easy to switch between cases
  - Taking a long time to fit each kernel (log-likelihood had an error!)

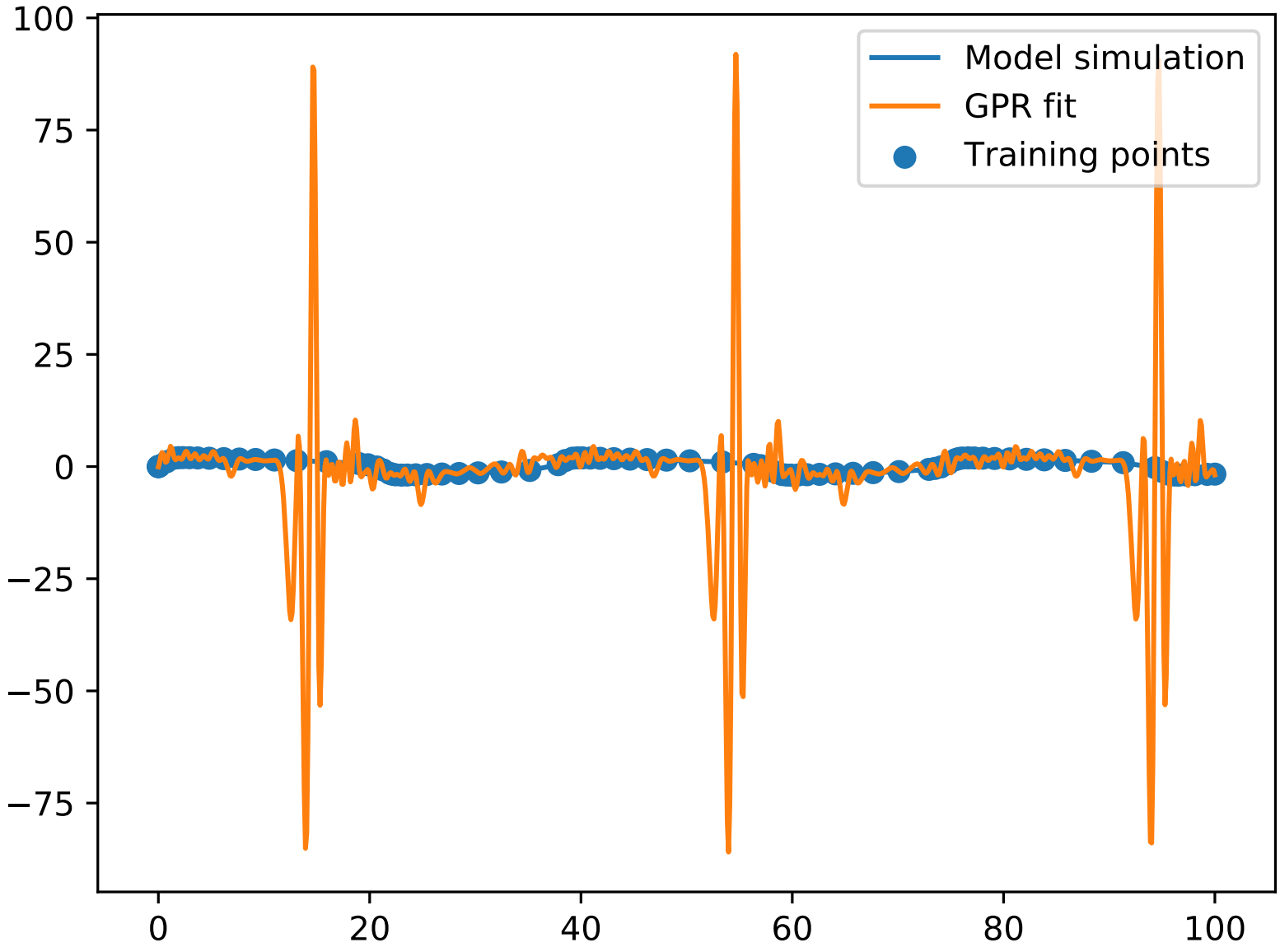
Neuron models - Fitzhugh Nagumo



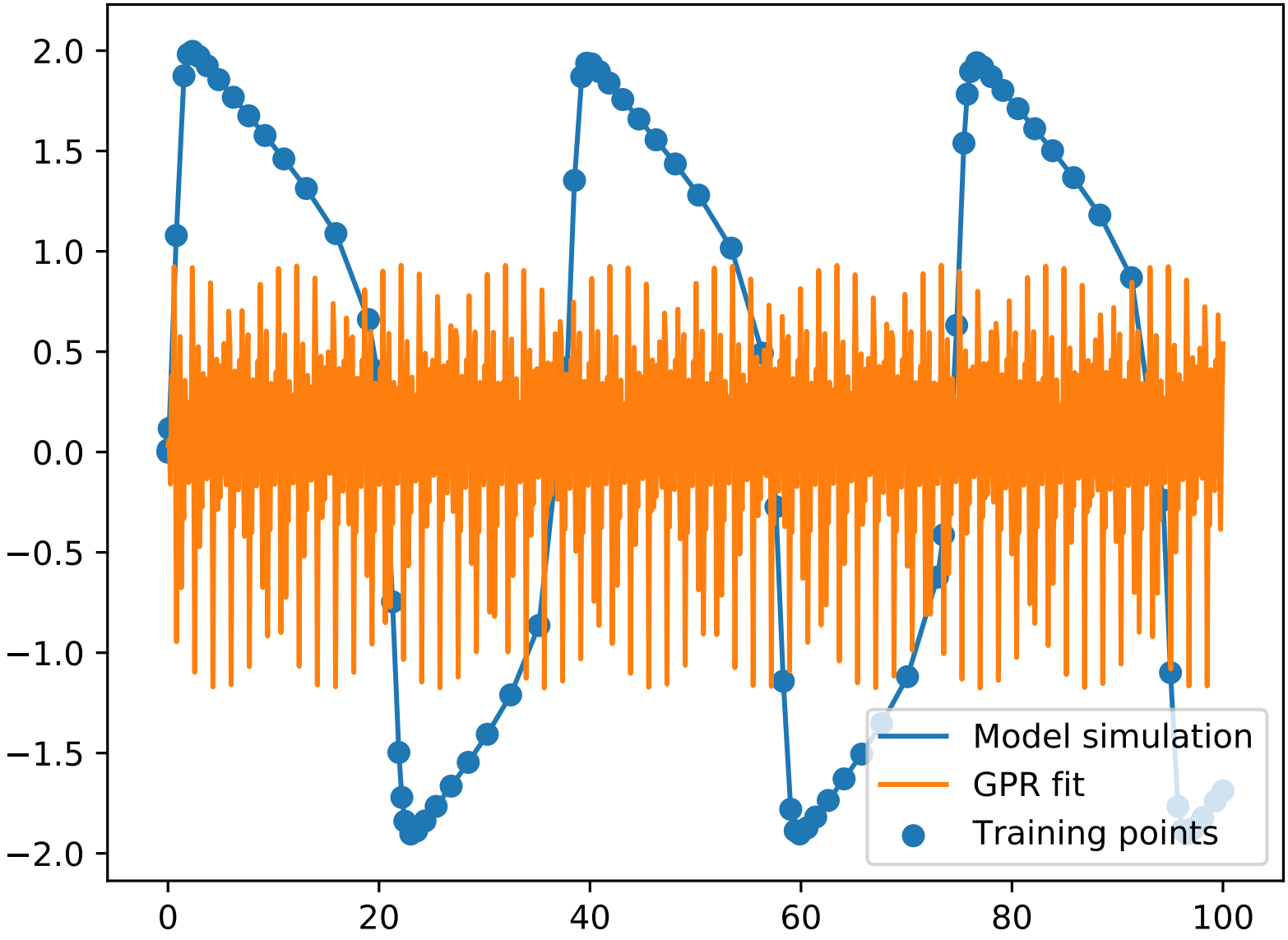
Fitzhugh Nagumo, SEKernel



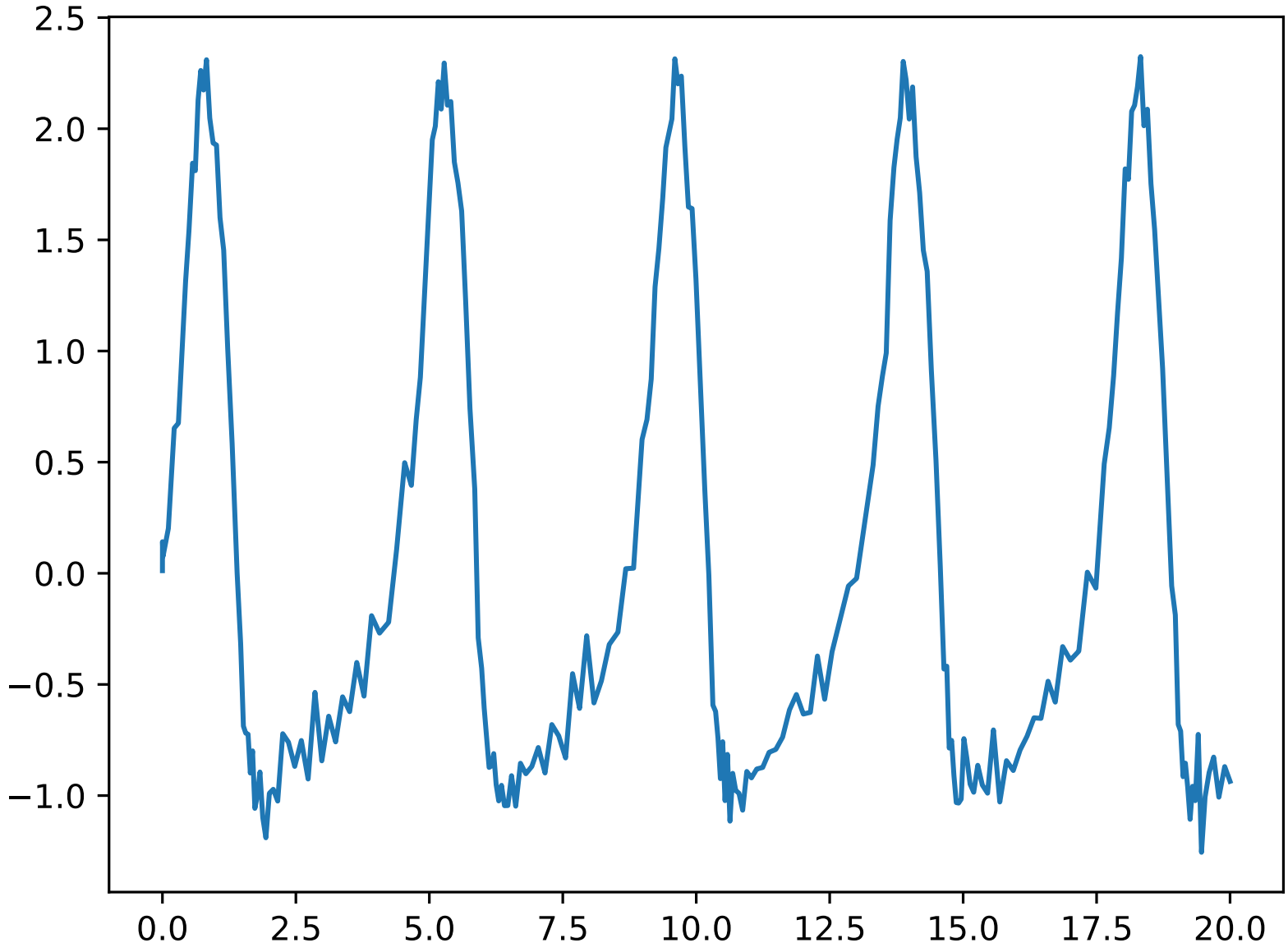
Fitzhugh Nagumo, modulo kernel



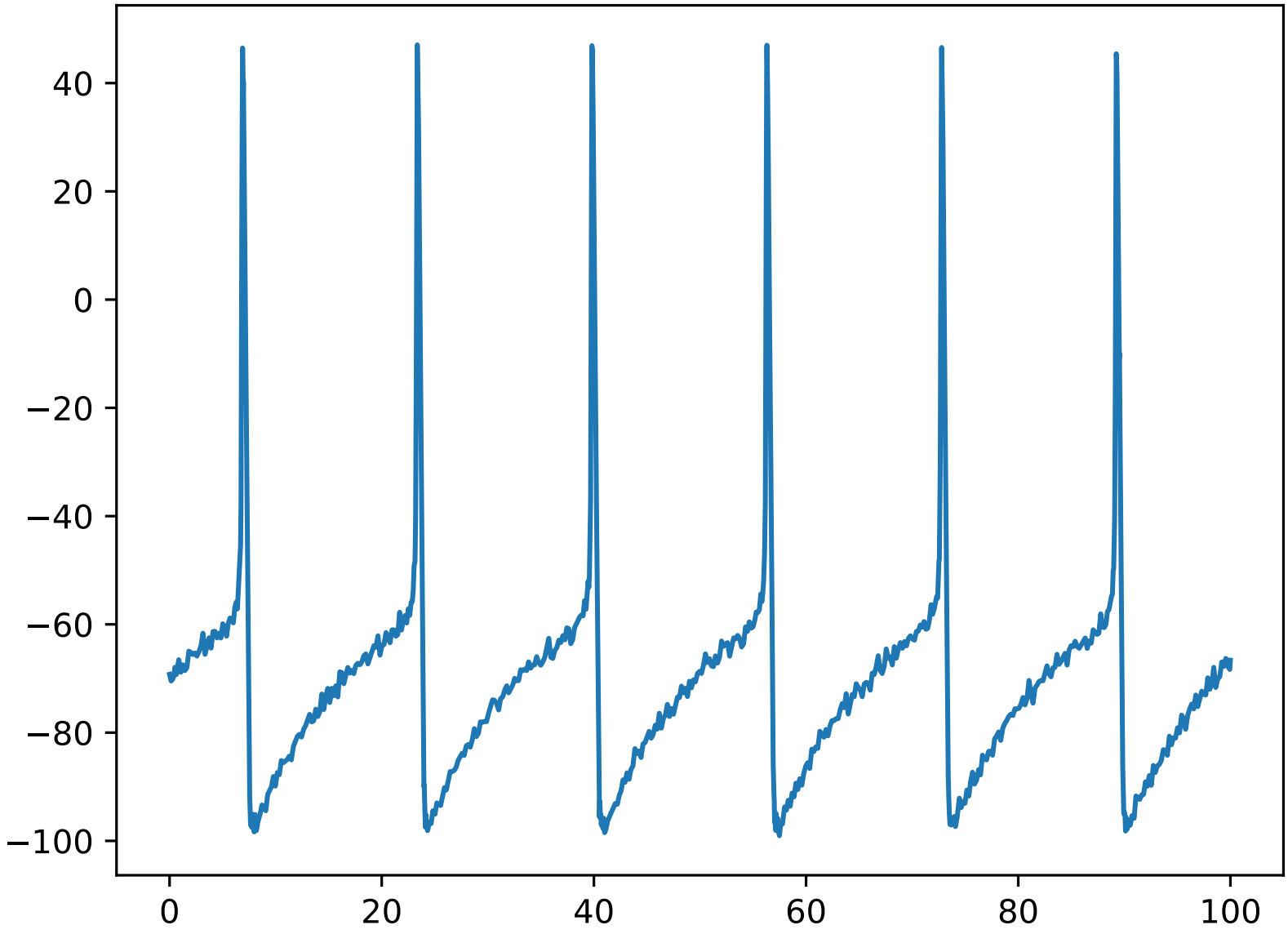
Fitzhugh Nagumo, cosine kernel



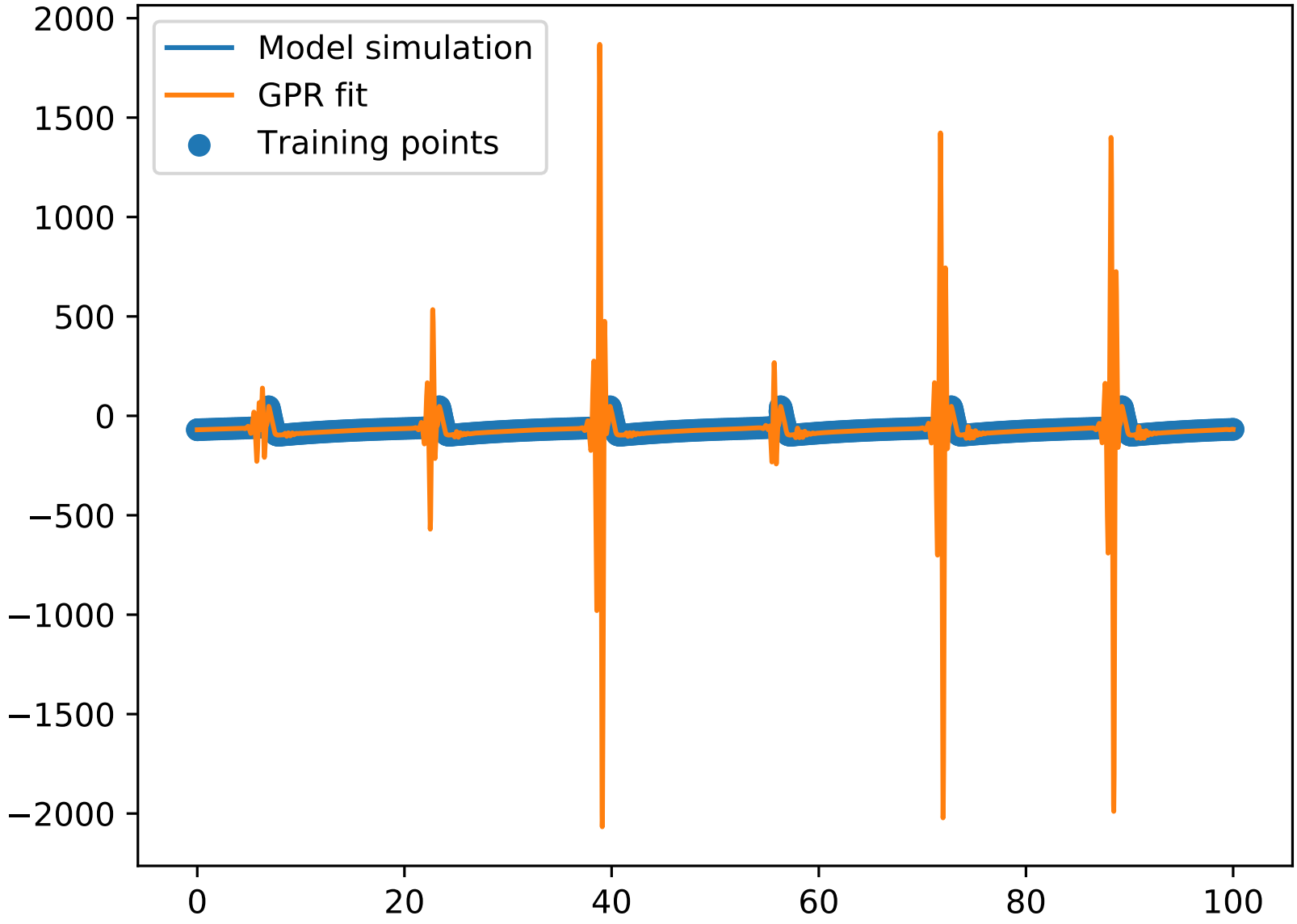
Neuron models - Hindmarsh Rose fast subsystem



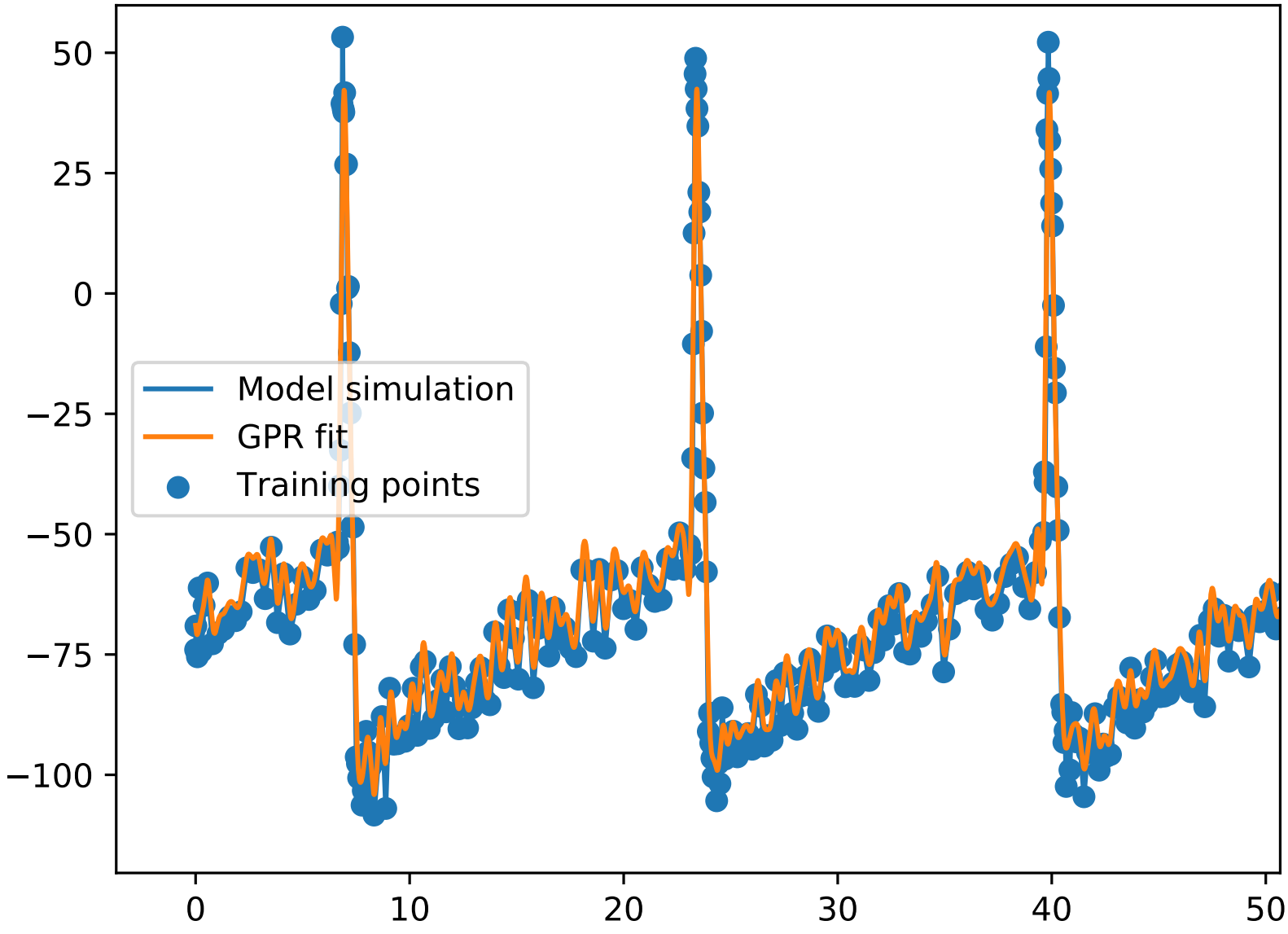
Neuron models - Hodgkin Huxley



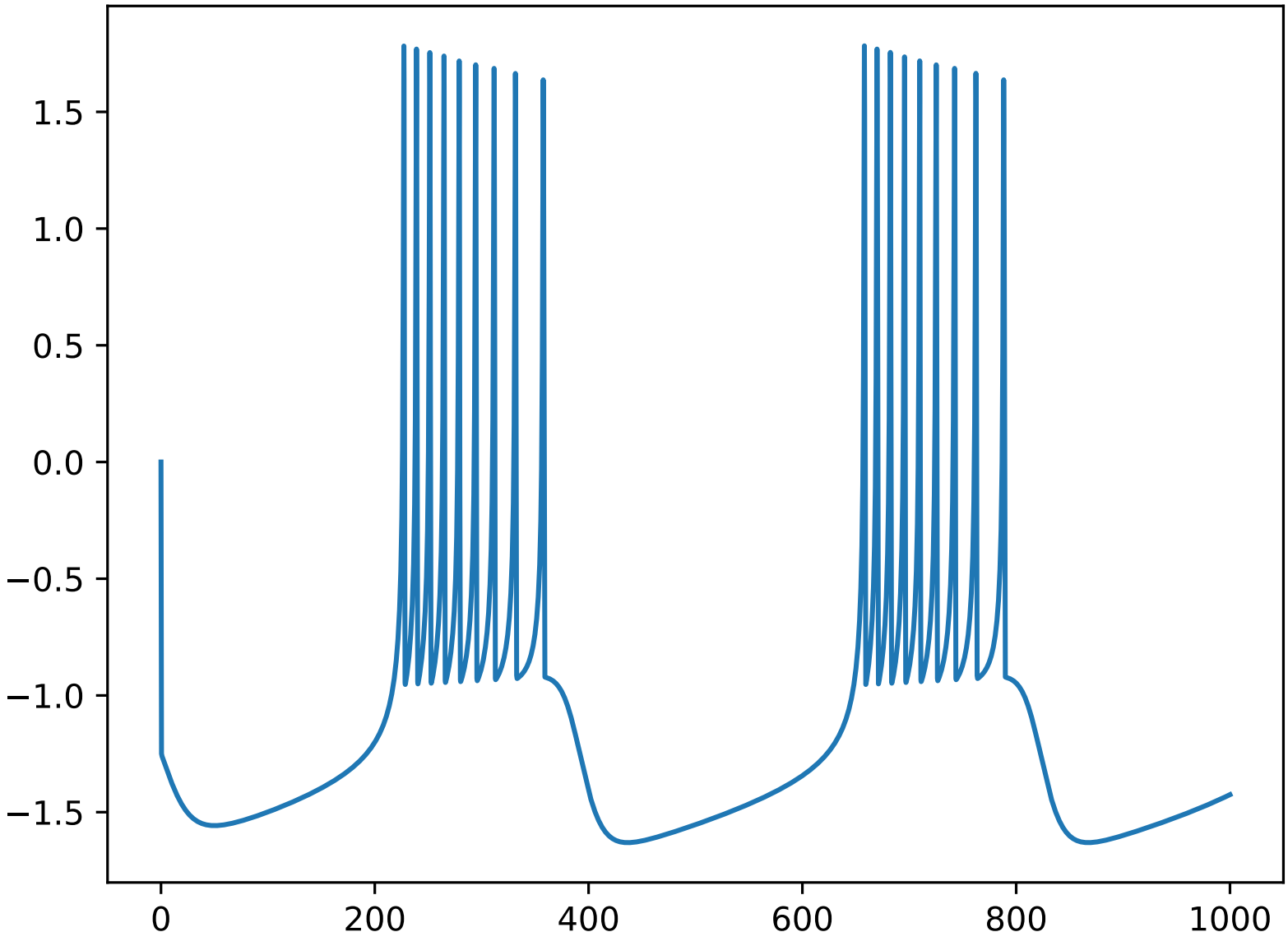
Hodgkin Huxley SEKernel



Hodgkin Huxley SEKernel



Neuron models



Codes

CBC code:

`https://github.com/MarkBlyth/SingleCellCBC`

GPR code:

`https://github.com/MarkBlyth/gpr_tests`

Can also put presentations on GitHub?

Next steps

- *[More]* teaching
- Full re-read of paper

then. . .

- More GPR testing
  - Add more kernels into the testing setup
  - Test everything!