Mathematical Foundations of Neuroscience - Sample Questions - Lecture 9 - Simple models of neurons and synapses

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Questions marked with * are not obligatory.

1. Why is the $I_{Na,p}$ - I_K or Hodgkin-Huxley model so inefficient for large simulations?

2. Describe the integrate and fire model.

3. Describe the resonate and fire model.

4. Describe neuromime. What are characteristic features of that model?

5. Describe the FitHugh-Nagumo model.

6. Describe the E. Izhikevich Simple Model. Why is this model so powerful? Can you give an analogy to quadratic integrate and fire model?

7. What are the main types of synapses?

8. Describe the source of instability in the explicit simulation of synaptic conductances (*).

9. Show how to avoid instabilities (*).