

Practical 4: AMPA synapse

Neural Computation 2005-2006. Mark van Rossum

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In this practical we simulate a population of AMPA synapses with the state-diagram given in the lecture notes. Download the script from the course website.

1. Check in matlab that the transition matrix has the properties stated in the lecture notes. Make sure you understand the script. The only open state in the diagram is the sixth entry in the state vector.
2. What is the steady state when the transmitter T is absent, i.e. $T = 0$. Guess how long it will take to reach it. What is the formal expression for the steady state for any given, fixed amount of T ?
3. What happens when you give two pulses close after each other?
4. Test what happens if you apply a longer pulse of transmitter. Explain.
5. Examine how the open occupancy depends on the the transmitter concentration.
6. The model so far describes the collective behaviour of a large (infinite) number of channels. However, individual channels are not deterministic but act stochastically. Suppose you would like to create a simulation of a small population of channels which behave stochastically. How would you rewrite the simulation to describe stochastic simulations?