

OSCILLATIONS IN NETWORKS OF INTEGRATE AND FIRE NEURONS WITH VARIOUS TOPOLOGY AND TIME ACTIVITY

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ABSTRACT

Spiking neuron models are highly popular for studies of neural coding, memory, and network dynamics. Most neurons in the cortex and in other areas of the brain communicate by short electrical pulses, which are called action potentials or spikes. The goal of this research is to study the dependency of the structure of the connections between the input, mitral and the granule layers and the parameters of the neural network. Different topologies designed for the purposes of simulations include excitatory, inhibitory or no connections as well as bidirectional and neighboring layer connections. By changing the weight, one can impact the strength of this inhibitory effect. The change of delay of the synapse results in an earlier or later inhibition of a mitral cell. The inhibition of mitral cells by granule cells leads to a reduction of the firing rate of spike trains and also to a hyperpolarization of the membrane potential of mitral cells.