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Stimulus-Dependent Polyrhythms of Central Pattern Generator Hardware

Authors : Le Zhao, Alain Nogaret

Abstract : We have built universal Central Pattern Generator (CPG) hardware by interconnecting Hodgkin-Huxley neurons with reciprocally inhibitory synapses. We investigate the dynamics of neuron oscillations as a function of the time delay between current steps applied to individual neurons. We demonstrate stimulus dependent switching between spiking polyrhythms and map the phase portraits of the neuron oscillations to reveal the basins of attraction of the system. We experimentally study the dependence of the attraction basins on the network parameters: the neuron response time and the strength of inhibitory connections.

Keywords : central pattern generator, winnerless competition principle, artificial neural networks, synapses
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