1014-92-1249 **Nikolai F Rulkov*** (nrulkov@ucsd.edu), 9500 Gilman Drive, La Jolla, CA 92093-0402, and **Maxim Bazhenov** (bazhenov@salk.edu), 10010 N Torrey Pines Rd., La Jolla, CA 92037.

Discrete-time neural models for large-scale network studies.

Intrinsic neuronal and synaptic properties control the responses of networks of thousands of neurons by creating spatio-temporal activity important for the sensory processing, memory formation and other cognitive tasks. The modeling of such systems requires neuron models capable to display both realistic response properties and computational efficiency.

We develop a set of difference equations to simulate main intrinsic properties of various types of neurons and synapses. This approach allows fast computation and efficient parametric analysis of the neural networks containing hundreds of thousands of neurons of different cell types using a conventional workstation. We present recent results on the modeling of large-scale spatio-temporal behavior of cortical networks, formation and restructuring of spatio-temporal patterns as a function of the network (synaptic) parameters and the intrinsic states of the neurons. We also focus on the modeling and analysis of complex intrinsic resonance properties of cortical neurons. Role of network dynamics in shaping and stabilizing the frequency range of reliable responses to external stimuli was studied in the large-scale network of excitatory cells and inhibitory interneurons. (Received September 27, 2005)