

## **EXCITABLE NEURODYNAMICS AND POSSIBLE NEURAL CODING WITH SPATIO-TEMPORAL SPIKES**

Kazuyuki Aihara

Department of Complexity Science and Engineering  
Graduate School of Frontier Sciences, The University of Tokyo,  
7-3-1, Hongo, Bunkyo-ku, Tokyo 113-8656, Japan  
and  
CREST, Japan Science and Technology Corporation (JST),  
4-1-8, Honcho, Kawaguchi, Saitama, 332-0012, Japan.  
[aihara@sat.t.u-tokyo.ac.jp](mailto:aihara@sat.t.u-tokyo.ac.jp)  
<http://www.sat.t.u-tokyo.ac.jp>

Although neurons have been theoretically modeled as simple processing elements like linear threshold elements in the field of artificial neurocomputing, physiological experiments with squid giant axons and numerical analysis with the Hodgkin-Huxley equations [1] have clarified that the behavior of real neurons is much more dynamical [2,3] than that of such simple neuron models. In particular, continuous threshold separatrix of nerve membranes in a generating process of action potentials [4,5] produces excitable nonlinear dynamics with orbital instability related to both strength and latency of neuronal response, which modeling may leads to development of a new kind of analog and asynchronous computing systems from the viewpoint of engineering [6].

A neural network model composed of neuronal elements with such excitable dynamics generates rich dynamical phenomena as a whole network with spatio-temporal structure of spikes. In this talk, I consider nonlinear dynamics with spatio-temporal spikes and possible neural coding, paying special attention to spatio-temporal structure of spikes with synchronized and desynchronized firing and effects of noise.

### **References**

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