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F-8(초) Phase Dynamics of Two Coupled Hodgkin-Huxley Neurons, Hyungtae Kook (Kyungwon Univ), Seunghwan Kim, Sang-Gui Lee (POSTECH), Jong Han Shin (ETRI).

The Hodgkin-Huxley (H-H) equations[1], derived based on biological origins, describe dynamics of action potentials in excitable neuronal membranes. Here we consider two coupled H-H neurons with various synaptic connections and the *dc* stimuli. As a system of coupled nonlinear oscillations, it exhibits various collective behavior of phase dynamics in a wide range of the parameter values. Diverse dynamical behavior such as mode locking, synchronous and out-of-phase states, instabilities and chaos are observed and explained in terms of microscopic dynamics of synaptic current. The order parameters are defined and used to classify and characterize distinct dynamics over different regimes of the parameter space. Possible extensions of the results to phase dynamics of many coupled neuron systems will be discussed.

1) A.L. Hodgkin and A.F. Huxley, *J. Physiol.*, 117:500-544, 1952

F-9(초) Critical behavior of period n-tuplings in coupled maps Sang-Yoon Kim (Kangwon Nat'l Univ.). We study the critical behavior of all period n-tuplings ($n=2,3,4,\ldots$) in coupled one-dimensional (1D) maps. We first investigate its dependence on n in two coupled maps using a renormalization method. Three (five) kinds of fixed points of a renormalization operator are found in the case of even (odd) n. The relevant "coupling eigenvalues" associated with coupling perturbations and the critical "coupling stability multipliers" that the coupling affects depend on both n and the fixed points. As examples, we study linearly- and dissipatively-coupled cases, and confirm the renormalization results. Finally, the results of the two coupled maps are extended to many coupled maps, in which the criticical behavior depends on the range of coupling.

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G-1(초)

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