ing scaling behavior of the current-voltage characteristics. The experimental values of ν are found to be in disagreement with predictions of previous simulation studies. We discuss possible origins for the discrepancies. Values of the dynamic exponent z are also compared with those of a 2D superconducting wire network.

내기 방법으로 조사하였다. 등방적 모형과 비등방적 모형은 다른 보편성군에 속하였다. 개체의 멸종은 사태 구조를 나타내었으며, 사태의 분포 $P(s)$는 멸종 시간에 대해서 멱 법칙, $P(s) \sim s^{-\tau}$ 을 따른다. 사태의 시간-공간적 분포는 프랙탈 구조를 보였다.

F-P004   **Effect of Parameter Mismatch and Noise on The Loss of Chaos Synchronization** 임우창, 김상윤 (강원대)   We investigate the effect of the parameter mismatch and noise on the loss of chaos synchronization in the case of unidirectional coupling. Through the first transverse bifurcation of an unstable periodic orbit embedded in the synchronous chaotic attractor (SCA), a riddling or bubbling transition occurs. For the riddling case, its basin of attraction becomes riddled with a dense set of "holes," leading to divergent orbits. In this case, any small parameter mismatch or noise transforms the SCA with the riddled basin into a chaotic transient. For a given coupling parameter c, the average life-time τ of a chaotic transient is found to scale with the mismatching parameter or noise intensity. Near the riddling transition point c_r, τ exhibits an exponential scaling, while in the region away from c_r τ exhibits an algebraic scaling. For the bubbling case, any small parameter mismatch or noise causes a persistent intermittent bursting inside an absorbing area, acting as a bounded trapping vessel. At first, with variation of c from the bubbling transition point, the maximum bursting amplitude increases continuously from zero. However, as c passes through a threshold value, it increases abruptly, in contrast to the case of symmetric coupling, because the absorbing area, confining the bursting, becomes suddenly widended through an interior crisis.

F-P002   **Efficiency of coding by neural ensemble** 권철안(명지대), 국형태(경원대), 한승기(충북대)   We present the study on neural coding by ensemble of neurons. Given a time-dependent stimulus, a spike train that is the temporal sequence of action potential firing transmits information. In real nervous systems, many neurons respond to external stimuli in a cooperative manner. We are interested in developing the theory of decoding to reconstruct stimuli from spike trains. Efficiency of information transmission can be measured by efficiency of decoding. We use the integrate-and-fire model to generate spike trains. Estimation of stimulus is found from the Volterra-Wiener functional expansion in terms of spike density functions for many neurons. Efficiency of reconstruction can be measured from the error $< (s(t) - s_{est}(t))^2 >$. We find that decoding by neural ensemble is more effective than that by single neuron. We discuss the validity of the linear expansion and suggest a way to find the higher order expansion.

F-P003   **생명체 진화 모형인 등방적 & 비등방적 Bak-Sneppen 모형의 보편성군** 이경은(인하대학교), 이재우(인하대학교)   오랫동안 생명체의 진화론을 지배해왔던 다윈의 이론은 상호작용하는 다체계를 설명하는데는 실패했다. 최근에 제어 변수를 가지지 않는 자체 조직화 현상을 보이는 계에 대한 연구가 활발하다. 거시적 생태계의 진화를 흉내내는 진화 모형인 Bak-Sneppen 모형은 자체 조직화 현상을 나타내는 대표적인 계이다. 등방적 및 비등방적 Bak-Sneppen 모형의 임계지수들을 몬테카를로 시능

F-P005   **Tricritical Behavior of Period Doublings in Unidirectionally Coupled Maps** 임우창, 김상윤 (강원대)   We study the scaling behavior of period doublings in two unidirectionally

coupled one-dimensional maps near a tricritical point which lies at an end of a Feigenbaum critical line and near a complicated part of the boundary of chaos. Note that both period-doubling cascades to chaos and multistability (associated with saddle-node bifurcations) occur in any neighborhood of the tricritical point. To analyze the scaling behavior near such a tricritical point, we develop an eigenvalue-value matching renormalization-group (RG) method, and find that the second response subsystem exhibits a type of non-Feigenbaum codimension-2 critical behavior. These RG results agree well with those obtained by a direct numerical method.

F-P006   좁은 세상 연결망 위에서 모래쌓기
조항현, 문희태(KAIST)   스스로 짜여진 고비성(SOC)을 보여주는 모래쌓기 모형을 좁은 세상 연결망 위에서 컴퓨터로 시늉내었다. 사태의 크기와 지속시간의 분포는 멱법칙을 따르며, 이 지수의 값은 연결망의 마구잡이정도에 따라 변한다. 이러한 현상을 연결망의 두 맺음변수인 경로길이와 뭉침계수의 개념으로부터 설명해내었다. 이 연구의 결과는 신경계 및 사회 시스템에 적용할 수 있다.

F-P007   좁은세상 연결망에서의 Hodgkin-Huxley 신경세포들의 자연 발화   권오규(KAIST), 문희태(KAIST)   Hodgkin-Huxley(HH) 신경세포에 대해 잡음과 연결구조에 따른 발화 현상을 살펴 보았다. HH 신경세포는 흥분계로써 문턱값 이하의 DC자극에 대해서는 발화를 보이지 않지만, 그 이상의 DC자극에 대해서는 주기적인 발화를 보인다. 문턱값 이하의 DC자극에 잡음을 가했을 때 한개의 HH 신경세포가 발화하는 모습을 살펴 보았다. 또한 여러개의 HH 신경세포들은 연결 했을 때의 발화 모습도 살펴 보았다. 잡음이 커질수록 발화의 빈도는 많아지나 그 간격은 더욱 불규칙해진다. 무작위도가 큰 연결망 구조 일수록 많은 세포들이 비슷한 시기에 발화하는 경향이 크게 나타났다.

F-P008   Multifractals in the Kim-Kong Map   김경식, 이종림, 최점수, 공영세(부경대)   We study chaotic and multifractal properties of a two parameter map of the unit interval onto itself. These results are compared with similar properties in well known one parameter maps. For maximum values of the height of our map, the cut-off value β^* can be obtained in a range of γ, and expected to monotonically take the value near one as γ goes to four. In our multifractal computations the values of the calculated fractal dimension are, rspectively, 0.8395, 0.9790, and 0.9951 for three chaotic orbits.

F-P009   Dielectric measurement of the model glass transition in orientationally disorder ethanol and cyclo-octanol   오지영, 황윤회, 김형국(RCDAMP, Pusans National University)   Orientationally disordered crystals possess translational order while retaining rotational and conformational degrees of freedom. Because these materials exhibit a glasslike transition, they are of great theoretical and experimental interest as model systems for structural glasses. We measured the comples dielectric susceptibility of the orientationally disorder phase of ethanol and cyclo-octanol, at temperatures ranging from 180℃ to 210℃ and from 200℃ to 280℃, respectively. We found that the frequency dependent susecptibility of ethanol and cyclo-octanol can be expresed by Cole-Davison form. The temperature dependent relaxation time obeyed Vogel Fulcher law. And the stretched exponent decreesed as the temperature decreased.

F-P010   Patterns of striped ordering in the lattice Coulomb gas   이승종(수원대), 김봉수(창원대), 이종림(부경대)   We find through Monte Carlo simulations that there exist a simple regularity in the low temperature configurations of the lattice Coulomb gas on a square lattice for charge number