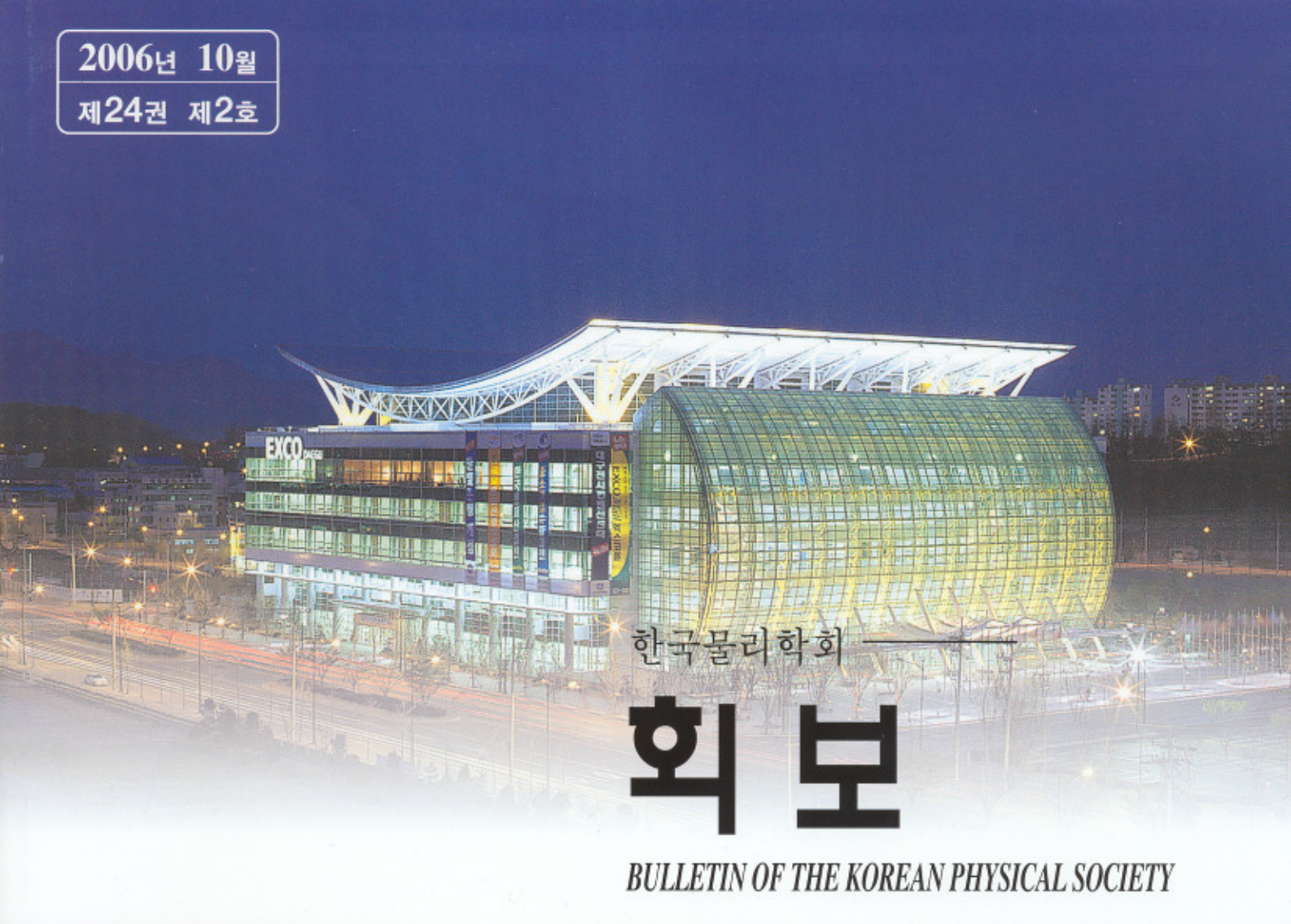
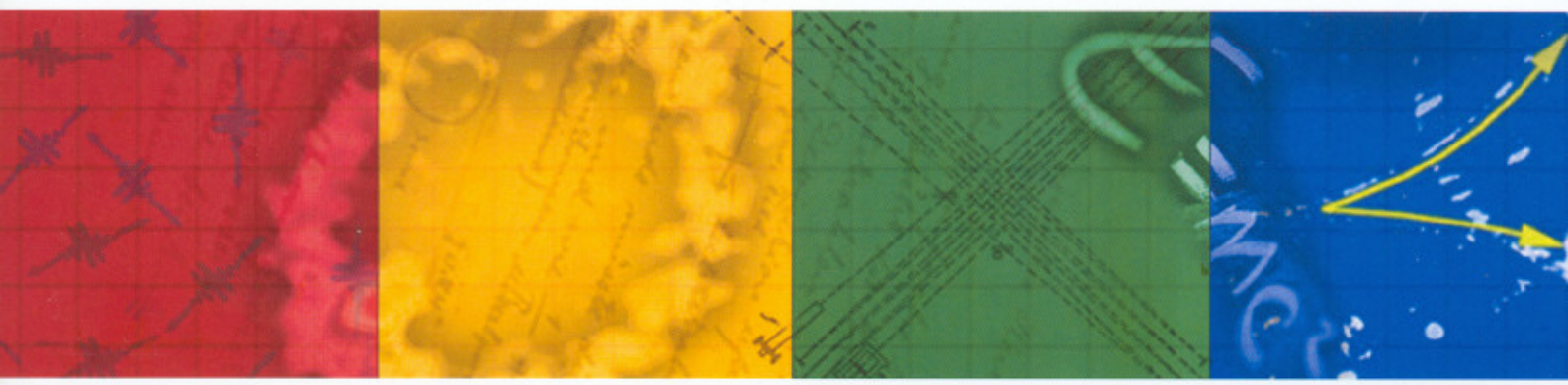
2006년 10월
제24권 제2호



한국물리학회

회보

BULLETIN OF THE KOREAN PHYSICAL SOCIETY



2006년 가을 학술논문발표회 및 임시총회

대구 EXCO

2006. 10. 19(목)~20(금)

KPS 사단법인 한국물리학회
The Korean Physical Society www.kps.or.kr

■ SESSION: F [F1]
10월 19일 (목), 15:00 - 16:30
409호

F-01(초) Critical behavior of the Contact Process on Complex Networks 하 미순, 박 형규[1], 홍 현숙[2] (*고등과학원, 전북대학교 물리학과. [1]고등과학원. [2]전북대학교 물리학과.*) We study the critical behavior of the contact process (CP) on scale-free networks (SFNs) by analytical and numerical. In particular, we focus on its finite-size scaling (FSS). The CP has been quite well studied as one of typical epidemic models yielding an absorbing phase transition at a finite critical value of the control parameter on regular lattices - the directed percolation universality class. However, it was controversial whether its critical behavior on SFNs is simple mean-filed (MF) or not. We propose a proper MF theory for the CP on SFNs and conjecture critical exponents including the value of the FSS exponent from the hyperscaling-type argument, which turns out to explain simulation data perfectly well..

F-02 The critical behavior of contact process with long range infection range LEE Sungmin, YOOK Soon-Hyung, KWON Sungchul, KIM Yup (*Kyung Hee Univ..*) We study the critical behavior of contact process with long range infection range. In the model, a randomly selected particle creates a particle on each empty site within infection range of a radius r with unit probability. The radius of the infection range distributes with power-law as $P(r) \sim r^{-(d+\sigma)}$ in d dimensions. We find mean field exponents of density, spatial and temporal correlations as $\beta=1$, $\nu_{\bot} = 1/(\sigma-1)$ and $\nu_{||} = 1$ for $d \geq d_c = 2(\sigma-1)$ respectively, where d_c is the upper critical dimension. In one dimension, we numerically find continuously varying critical behavior for $3/2 \leq \sigma \leq 3 $. The critical behavior belongs to directed percolation class for $\sigma >3$ and mean-field class for $\sigma \leq 3/2$ respectively.

F-03 Strange Nonchaotic Spiking in the Quasiperiodically Forced Hodgkin-Huxley Neuron LIM Woochang, KIM Sang-Yoon[1](*아주대학교 의과학연구소. [1]강원대학교 물리학과.*) We study the transition from a resting to a spiking state in the quasiperiodically forced Hodgkin-Huxley neuron. Two types of transitions to a strange nonchaotic spiking state are thus found. The first type of transition is a nonhysteretic one (without hysteresis) from a resting two-torus state to a strange nonchaotic spiking state, which is then evolved into a chaotic spiking state. For this case, the mean spiking rate increases gradually from zero when a control parameter passes a threshold value. This is incontrast to the periodically forced case where the resting two-torus transforms directly into a chaotic spiking state. The mechanism for this transition is also discussed using a rational approximation to the quasiperiodic forcing. On the other hand, for the second type of hysteretic transition the resting two-torus state jumps to a strange nonchaotic spiking state with a nonzero mean spiking rate. For both types of transitions strange nonchaotic spiking states are characterized in terms of the interspike interval histograms and the peak to base ratios in the power spectra. In the absence of noise, they exhibit a kind of ``intrinsic" stochatic resonance, which is evidenced by amultimodal aperiodic spiking pattern (skipping phenomenon) and a bell-shaped resonance curve in the peak-to-base ratio. The noise effect on this strange nonchaotic spiking state is discussed. These two types of strange nonchaotic spikings are also observed in the quasiperiodically forced FitzHugh-Nagumo model.

F-04 Emergence of Chaotic Itinerancy in Simple Ecological System KIM PAN-JUN, KO TAE-WOOK[1], JEONG HAWOONG, LEE KYOUNG J.[1], HAN SEUNG KEE[2](*KAIST. [1]Korea Univ. [2]Chungbuk Natl Univ.*) Chaotic itinerancy is a universal dynamical concept that describes itinerant motion among many different ordered states through chaotic transition in dynamical systems. Unlike the expectation of the prevalence of chaotic itinerancy in high-dimensional systems, we identified the chaotic itinerant behavior from a relatively simple ecological system, which consists only of two coupled consumer-resource pairs. The system exhibits the chaotic bursting activity in which the explosion and the shrink of the population alternate indefinitely, while the explosion of one pair co-occurs with the shrink of the other pair. We analyzed successfully the bursting activity in the framework of chaotic