2003년도 가을 학술논문발표회 논문초록집
Mechanism For The Partial Synchronization in Coupled Chaotic Systems SON Woo-Sik, LIM Woochang, KIM Sang-Yoon, PARK Young-Jai (Kangwon Nat’l Univ.) We investigate the dynamical mechanism for the partial synchronization in three coupled one-dimensional maps. A completely synchronized attractor on the diagonal becomes transversely unstable via a blowout bifurcation, and then a two-cluster state, exhibiting on-off intermittency, appears on an invariant two-dimensional plane. If the two-cluster state becomes transversely stable, then a partial synchronization may occur on the invariant plane. Otherwise, total desynchronization takes place. It is found that the transverse stability of the two-cluster state may be determined through the competition between its laminar and bursting components. When the “transverse strength” (i.e., a weighted transverse Lyapunov exponent) of the laminar component is larger (smaller) than that of the bursting component, a partially synchronized (totally desynchronized) attractor appears through the blowout bifurcation.

Dynamical Origin for the Occurrence of Asynchronous Hyperchaos and Chaos via Blowout Bifurcations LIM Woochang, KIM Sang-Yoon, OTT Edward1, HUNT Brian2 (University of Maryland, U.S.A.) We investigate the dynamical origin for the occurrence of asynchronous hyperchaos and chaos via blowout bifurcations in coupled chaotic systems. An asynchronous hyperchaotic or chaotic attractor with a positive or negative second Lyapunov exponent appears through a blowout bifurcation. It is found that the sign of the second Lyapunov exponent of the newly-born asynchronous attractor, exhibiting on-off intermittency, is determined through a competition between its laminar and bursting components. When the strength (i.e., a weighted second Lyapunov exponent) of the bursting component is larger (smaller) than that of the laminar component, an asynchronous hyperchaotic (chaotic) attractor appears.

Regular Wave Formation by Time Delay in Randomly Coupled Oscillators 고 대욱, 정 성욱, 문 휴태(한국과학기술원 물리학과) We investigate the dynamics of coupled oscillators with time-delayed interactions mediated by signals of finite and constant speed. It is shown that time delays proportional to the Euclidean distance between interacting oscillators can induce regular traveling waves even though oscillators are randomly coupled. Stability criteria for wave states and synchronous states are discussed.

A Nonlinear Noise Reduction Scheme Based On Information Theory BAEK Seung Ki, MOON Hie-Tae(KAIST) We developed a noise reduction scheme based on information theory, operating on condition of knowing chaoticity and noise level. It does not solve error minimization problem, but instead completely removes noisy parts and then recovers them from other remaining credible parts. We also propose dynamics can be inferred using the concept of predicting power, induced from the above scheme.

제주산 군소(Aplysia)의 북부 신경계에 있는 신경 세포들의 발화 양상 HYUN Nam Gyu, KIM Yong Joo, CHO Hyoung Jun, PARK Duck-Gun(제주대학교 물리학과) 지난 2003년 7월 제주도 제주대학교 신경 생물학 실험실에 있는 실험 장비들을 이용하여 남해수산 실험실 신경학 팀의 협력에서 해녀가 캐쳐한 군소의 북부 신경계에 있는 여러 신경 세포들에서 발생하는 신호들을 측정하였으며 A/D converter를 이용하여 이것들을 자료화하였습니다. 이 포스터 발표 자료에서는 이 신경 세포들에서 발생하는 Beating 및 Bursting 신호들 중복 아니라 이것들의 복잡적인 형태의 신호를 내는 세 포들의 복잡적인 위치와 그 신호의 모양들을 정리하여 제시 한다.