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F-01(초) **Generalized synchronization and neural decoding of chaotic stimulus** 한승기, 김원섭(충북대) 뉴런은 연속적인 외부 자극을 spiking train으로 바꾸어준다. spiking train으로 부터 어떻게 입력 자극을 알아내는 가 하는 neural decoding 문제는 최근에 신경과학의 주 관심사가 되고 있다. 본 연구에서는 chaotic 입력 자극을 받은 뉴런의 spiking train으로 부터 입력 자극을 어떻게 decoding할 수 있는 가를 다루고자 한다. 뉴런이 oscillatory 상태에 있을 때, chaotic 자극과 뉴런의 periodic 상태 사이에 다양한 동기화(phase, generalized synchronization)가 가능한 데, 이러한 동기화 상태가 입력 자극의 decoding에 중요함이 보여준다. 또한 decoding에 잡음의 영향, population coding의 영향을 조사한다.

F-02(초) **Chaos Synchronization in Unidirectionally Coupled Maps** 김상윤, 임우창 (강원대) Transverse instability of the synchronous chaotic attractor (SCA) is investigated in unidirectionally coupled one-dimensional maps. Its transverse stability begins to lose when the first periodic saddle embedded in the SCA becomes unstable transversely. For the case of the supercritical period-doubling transverse bifurcation, an "absorbing area" that acts as a trapping bounded vessel exists, and hence the basin of attraction (BA) of the SCA becomes only locally riddled. However, for the case of the transcritical transverse contact bifurcation between the saddle fixed point on the boundary of the SCA and the repeling fixed point on the boundary of its BA, such absorbing area disappears, and then the BA becomes globally riddled. For this transcritical bifurcation case, superpersistent chaotic transients arise when a parameter mismatch is introduced. Note that this is the unique way leading to the global-riddling transition for the dissipatively-coupled case. Another superpersistent chaotic transients also arise due to the boundary crisis mediated by a repeller-saddle bifurcation. However, the asynchronous chaotic attractor, which appears via the boundary crisis, occupies only some part of the BA of the SCA without riddling. As a final stage of desynchronization, blow-out bifurcation through which the SCA becomes a chaotic saddle will also be discussed.

F-03 **Noise-induced oscillation in fully frustrated Josephson-junction ladders** 전건상(복합다체계 물성연구센터), 최무영(서울대) We investigate noise-induced oscillations in fully frustrated Josephson-junction ladders, which are driven by uniform constant currents. At zero temperature large currents drive the vortex array along the ladder, inducing oscillations between two ground states, while the lattice potential forces the system to remain in one of the two states for small currents. On the other hand, at finite temperatures oscillations between the two states appear even below the critical current, as manifested by the peak of the power spectrum of the staggered magnetization at a nonzero frequency. It is found that the peak frequency tends to shift to a higher value as the temperature is raised. The relation to the stochastic resonance in an autonomous system is also discussed.

F-04 **Phase synchronization and noise-induced resonance in a system of globally coupled oscillators** 홍현숙, 최무영 (서울대학교 물리학과) We study the synchronization phenomena and the noise-induced resonance behavior in a system of globally coupled oscillators, each possessing finite inertia. The self-consistency equation for the order parameter, which measures collective synchronization of the system, is derived and behavior of the order parameter is investigated as the noise strength is varied. It is found that the hysteresis present in the system without noise disappears as the thermal noise comes into the system. The power spectrum of the phase velocity is also obtained and the possibility of noise-induced resonance is examined.