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F-P020

튀는 공의 혼돈 운동 분석 . 김종휴, 김풍호, 김상락 (경기대학교 물리학과). 모형화한 튀는 공의 단순한 역학계가 아주 복잡한 운동 형태인 혼돈운동이 나타난다는 사실이 이미 잘 알려져있다. 계를 구성하는 매개변수(바닥의 진폭 A,반발 결수 e)에 따라 주기 배증에 의한 혼돈으로의 전이 과정에서 주기 배증이 깨지는 지점에서부터 다른 혼돈구조가 나타난다. 이것을 자기소생혼돈(self-reanimating chaos)이라 하며 이 혼돈운동이 갑자기 증폭되는 위기(crisis)가 일어난다. 우리는 바닥의 가속도가 사인파 모형과 네모파 모형으로 떠는 튀는 공의 역학계에 대해서 자기소생혼돈과 이 영역 내에서 일어나는 위기현상을 보다 엄밀히 분석하고 고찰해보았다.

F-P021 Period Doublings in Coupled Parametrically Forced Damped Pendulums. *Kijin Lee and Sang-Yoon Kim (Kangwon Nat'l Univ.).* We study period doublings in N ($N \geq 2$) coupled parametrically forced damped pendulums by varying A (the amplitude of the external driving force) and c (the strength of coupling). With increasing A, the stationary point undergoes multiple period-doubling transitions to chaos. We first investigate the two-coupled case with $N=2$. For each period-doubling transition to chaos, the critical set consists of an infinity of critical line segemnts and the zero-coupling critical point lying on the $A = A_i^*$ line in the $A-c$ plane, where A_i^* is the ith transition point for the uncoupled case. We find three kinds of critical behaviors, depending on the position on the critical set. They are the same as those for the coupled one-dimensional maps. Finally, the results of the $N=2$ case are extended to many-coupled cases with $N \geq 3$.

F-P022 Multiple Transitions to Chaos in a Damped Parametrically Forced Pendulum. *Kijin Lee and Sang-Yoon Kim (Kangwon Nat'l Univ.).* We study bifurcations associated with the stationary point (SP) of a damped parametrically forced pendulum by varying ω_0 (the natural frequency of the pendulum) and A (the amplitude of the external driving force). As A is increased, the SP will restabilize after its instability, destabilize again, and so *ad infinitum* for any given ω_0. Its destabilizations (restabilizations) occur via alternating supercritical (subcritical) period-doubling bifurcations (PDB's) and pitchfork bifurcations, except the first destabilization at which a supercritical or subcritical bifurcation takes place depending on the value of ω_0. For each case of the supercritical destabilizations, an infinite sequence of PDB's follows and leads to chaos. Consequently, an infinite series of period-doubling transitions to chaos appears with increasing A. The critical behaviors at the transition points are also discussed.