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F-1(초) **Bifurcation structures of driven nonlinear oscillators** *김영태,이상열(아주대), 김상윤(강원대)* 자연계에는 다양한 강제구동 비선형 진동자가 존재한다. 이들 진동자는 간단한 상미분방정식으로 모델링할 수 있기 때문에 digital simulation과 analog simulation을 통하여 비선형 진동자의 동역학적 특성을 연구하여 왔다. 본 연구에서는 simulation을 이용해 조사한 가장 대표적인 비선형 진동자인 Duffing 진동자의 bifurcation 구조를 소개하고 이를 Toda, Morse 진동자 등의 다른 진동자들의 bifurcation 구조와 비교해본다. 아울러 비선형 진동자에서 흔히 관찰되는 period doubling와 saddle-node bifurcation, chaos, hysteresis, crises, intermittency, symmetric- asymmetric orbit, large-small orbit transition 등도 소개한다.

F-2(초) **A Method of Conditional Average Applied To The Problem of Passive Scalar Transport** *양택진 (숭실 대학교), 김창배 (숭실 대학교)* The problem of reducing the number of degrees of freedom necessary to describe fluid turbulence, using conditional average, is applied to the problem of turbulent passive scalar transport. We derive an large scale equation of motion that exhibits the form invariance unser the renormalization group transformation with the effective diffusivity. The eddy Prantle number is found to be Pr $\sim$ 0.6, within the restricted region, where the value of the Obukhov-Corrsin constant is 1.02 $\pm$ 0.01.

F-3(초) **Bicritical Behavior of Period Doublings in Unidirectionally Coupled Maps** *김상윤 (강원대)* We study the scaling behavior of period doublings in two unidirectionally-coupled one-dimensional maps near a bicritical point where two critical lines of period-doubling transition to chaos in both subsystems meet. Note that the bicritical point corresponds to a border of chaos in both subsystems. For this bicritical case, the second response subsystem exhibits a new type of non-Feigenbaum critical behavior, while the first drive subsystem is in the Feigenbaum critical state. Using two different methods, we make the renormalization group analysis of the bicritical behavior and find the corresponding fixed point of the renormalization transformation with two relevant eigenvalues. The scaling factors by the renormalization group analysis agree well with those obtained by a direct numerical method.

F-4(초) **Traveling Time and Traveling Length for Flow in Porous Media** *YOUNGKI LEE, S. V. BULDYREV, N. V. DOKHOLYAN, G. PAUL, H. E. STANLEY(Boston Univ.), J. S. ANDRADE(Universidade Federal), P. R. KING(BP Amoco Exploration), and S. HAVLIN(Bar-Ilan Univ.)* We study traveling time and traveling length for tracer dispersion in porous media. We model porous media by two-dimensional bond percolation, and we model flow by tracer particles driven by a pressure difference between two points separated by Euclidean distance r. We find that the minimal traveling time t_{min} scales as $t_{min} \sim r^{1.33}$, which is different from the scaling of the most probable traveling time, $\tilde{t} \sim r^{1.64}$. We also calculate the length of the path corresponding to the minimal traveling time and find $\ell_{min} \sim r^{1.13}$ and that the most probable traveling length scales as $\tilde{\ell} \sim r^{1.21}$. We present the relevant distribution functions and scaling relations.

F-5(초) **The Soft-Mode Membrane Instability Induced by Strong Interaction with Polymers** *성우경, 이승균 (포항공대 물리학과)* The interaction between a flexible polymer and a fluctuating membrane is a fundamental problem in soft matter physics with relevance to biological phenomena occurring in cells. We find that the fluctuation of polymers in a strongly adsorbed state can renormalize the surface bending rigidity to a negative value. It gives rise to a novel phenomenon that the surface (membrane) can be unstable to spontaneous formation of a soft mode, i.e., undulation with very large amplitude and the wave length comparable to the interaction range.