

Zaks 等人则研究了全连接随机相位振子网络中的分岔等动力学行为。这里,噪声强度是外界驱动的控制参数。随机相位振子全连接网络的噪声驱动模型为(见文献[15]):

$$\dot{\varphi}_i = 1 - a \sin \varphi_i + \frac{W}{N} \sum_{j=1}^N \sin(\varphi_j - \varphi_i) + \xi_i(t), \quad i = 1, 2, \dots, N \quad (9-38)$$

其中 $\xi_i(t)$ 是高斯白噪声。不同的噪声强度驱使网络在静止、旋转和局部震荡三种状态之间切换,如图 9-11 所示。特别地,这种震荡行为经过分析发现是由网络中出现的 Hopf 分岔所导致的,如图 9-12 所示。

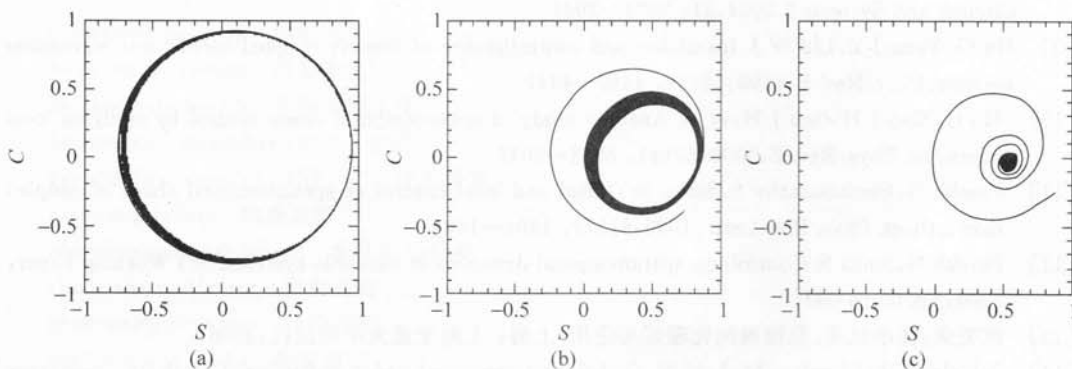


图 9-11 随机相位振子网络在不同噪声强度驱动下所处的状态(取自文献[15])

(a) 旋转; (b) 震荡; (c) 静止

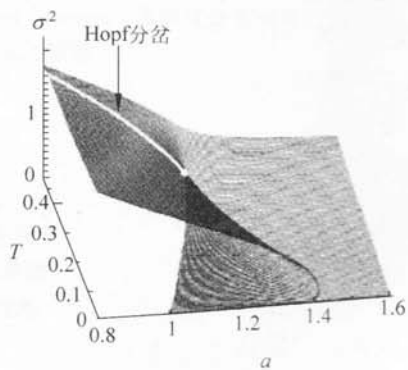


图 9-12 随机相位振子网络在随机噪声驱动下的 Hopf 分岔(取自文献[15])

参考文献

- [1] Wiener N. Cybernetics: or the Control and Communication in the Animal and the Machine, Cambridge, Massachusetts: MIT Press, 1948
- [2] Ott E, Grebogi C, Yorke J A. Controlling chaos. Physical Review Letters, 1990, 64: 1196~1199
- [3] Hu G, Qu Z L. Controlling spatiotemporal chaos in coupled map lattice systems. Physical Review Letters, 1994, 72(1): 68~71
- [4] Roy R, Murphy T W, Maier Jr T D, Gills Z. Dynamical control of a chaotic laser: Experimental

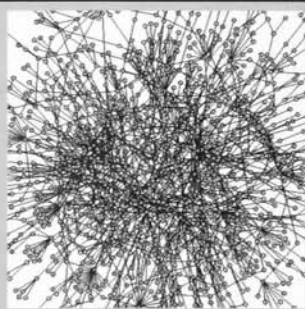
- stabilization of a globally coupled system. *Physical Review Letters*, 1992, 68: 1259~1262
- [5] Wang X F, Chen G. Pinning control of scale-free dynamical networks. *Physica A*, 2002, 310: 521~531
- [6] Li X, Wang X F. Pinning control of scale-free Chen's networks. *The Second Asia-Pacific Workshop on Chaos Control and Synchronization at Shanghai*, 2003
- [7] Li X, Wang X F. Feedback control of scale-free coupled Henon maps. *Proceeding of the Eighth International Conference on Control, Automation, Robotics and Vision (ICARCV) at Kunming, China*, 2004, 574~578
- [8] Li X, Wang X F, Chen G. Pinning a complex dynamical network to its equilibrium. *IEEE Trans. on Circuits and Systems-I*, 2004, 51: 2074~2087
- [9] Hu G, Yang J Z, Liu W J. Instability and controllability of linearly coupled oscillators: eigenvalue analysis. *Phys. Rev. E*, 1998, 58(4): 4440~4447
- [10] Hu G, Xiao J H, Gao J H, et al. Analytic study of spatiotemporal chaos control by applying local injections. *Phys. Rev. E*, 2000, 62(3): 3043~3047
- [11] Parekh N, Parthasarathy S, Sinha S. Global and local control of spatiotemporal chaos in coupled map lattices. *Phys. Rev. Lett.*, 1998, 81(7): 1401~1404
- [12] Parekh N, Sinha S. Controlling spatiotemporal dynamics in excitable systems. *SFI Working Paper*, 2000, No. 00-06-031
- [13] 陈关荣, 汪小帆著. 反馈混沌化理论与应用. 上海: 上海交通大学出版社, 2006
- [14] Samoletov A, Chaplain M, Levi V. Global spatiotemporal order and induced stochastic resonance due to a locally applied signal. *Phys. Rev. E*, 2004, 69: 045102
- [15] Zaks M A, Neiman A B, Feistel S, Schimansky-Geier L. Noise-controlled oscillations and their bifurcations in coupled phase oscillators. *Phys. Rev. E*, 2003, 68: 066206

名词对照

assortative network	同配网络
autonomous system	自治系统
average path length	平均路径长度
betweenness centrality (BC)	介数
breadth-first search (BFS)	广度优先搜索
cascading failure	相继故障
characteristic path length	特征路径长度
clustering coefficient	聚类系数
community structure	社团结构
configuration model	配置模型
coreness	核数
correlated network	关联网
coupled map lattice (CML)	耦合映象格子
cumulative degree distribution function	累积度分布函数
decentralized algorithm	分散式算法
degree	度
degree distribution	度分布
diameter	直径
directed network	有向网络
disassortative network	异配网络
epidemic threshold	传播临界值
exponential network	指数网络
fitness model	适应度模型
fragility	脆弱性
generalized random graph	广义随机图
globally coupled network	全局耦合网络
greedy algorithm	贪婪算法
hierarchical network	等级网络
homogeneous network	均匀网络
heterogeneous network (inhomogeneous network)	非均匀网络
immunization	免疫
in-degree	入度
local-world	局域世界
local-world evolving network	局域世界演化网络
mean-field theory	平均场理论

modularity 模块性
module 模块
motif 模体
nearest-neighbor coupled network 最近邻耦合网络
out-degree 出度
pattern 斑图
pinning control 牵制控制
power-law 幂律
preferential attachment 优先连接
random graph 随机图
random walk (RW) 随机游走
randomized network 随机化网络
renormalization 重整化
robustness 鲁棒性
scale-free 无标度
self-dissimilarity 非自相似性
self-similarity 自相似性
significance profile (SP) 重要性剖面
simple graph 简单图
six degrees of separation 六度分离
small world experiment 小世界实验
small world project 小世界项目
star coupled network 星形耦合网络
subgraph 子图
superfamily 超家族
synchronization 同步
triad significance profile (TSP) 三元组重要性剖面
uncorrelated network 无关联网络
undirected network 无向网络
unweighted network 无权网络
weighted network 加权网络

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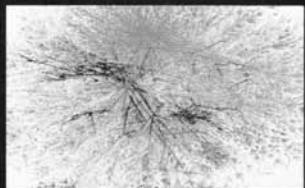
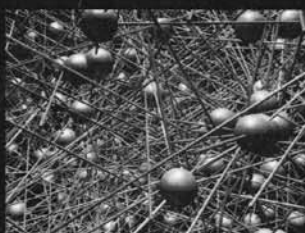
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