Contents

W. EBELING, M. PESCHEL
Introductory Remarks 9

Part I: Theory of the Lotka-Volterra Approach

YU. M. SVIREZHEV, D.O. LOGOFET
Complicated dynamics in simple models of ecological systems 13

E. AMANN, J. HOFBAUER
Permanence in Lotka-Volterra and Replicator Equations 23

J. COSTE
Dynamical regression in complex systems-Ecological examples 35

M. PESCHEL, W. MENDE, W. JANSEN, F. ALBRECHT
Chain decomposition of growth functions and structure models of ecological systems 45

W. EBELING, R. FEISTEL
Continuous Lotka-Volterra models for evolution processes 55

K. SIGMUND
The Maximum Principle for Replicator Equations 63

A.M. MOLTSCHANOV
Bilinear and Hamilton Systems, Macrodynamics 72

Part II: Julia Sets and Strange Attractors

H.O. PEITGEN, M. PRÜFER, P.H. RICHTER
Phase Transitions and Julia Sets 81

H.G. BOTHE
Geometry of Attractors, some rigorous results 103

Part III: Dynamic Systems and Information Problems

W. JANSEN, U. KRIEGEL
Some problems of the parameter identification of strange attractors 114

J.S. NICOLIS, I. TSUDA
Chaotic dynamics of Information Processing: The 'magic number seven plus-minus two'revisited 123

G. CZAJKOWSKI
Information-theoretical methods in the stochastic theory of open systems 133

Part IV: Application of the Lotka-Volterra Approach and other iteraction structures

CH. J. LUMSDEN
Lotka-Volterra Statistical Mechanics in cell-membrane/ cellmetabolism systems 143

H. HERZEL, W. EBELING, L. SCHIMANSKY-GEIER, E.E. SEL'KOV
The influence of noise on an biochemical oscillator 152

K.P. HADELER
Models for parasitic deseases 162

A. HUNDING
Spontaneous biological pattern formation in three dimensions - The morphogene prepattern theory of mitosis and cytokinesis 170

K.R. SCHNEIDER
Existence of wave trains in reaction-diffusion systems ..,..... 182

P.M. ALLEN, G. ENGELEN
Modelling the spatial evolution of population and employment -
The case of the United States 191

Part V: Poster Contributions

U. GROTE
Qualitative analysis of Volterra Equations and its Riccati
Transformation with special regard to bifurcation behaviour 213

R. FUNKE
Robustness of the solution of stochastic Volterra differential
equations 217

B. STRAUBE
An attempt of a fuzzy approach to Volterra systems 220

TH. SCHULMEISTER, W. MEISKE
Chaos in a Lotka-Volterra-System - A numerical study 224

H.M. VOIGT
Structuring and Evolution Processes 228

U. KRIEGEL, W. MENDE, M. GRAUER
Investigation of World Energy consumption and World Population in
terms of a Hyperlogistic Evolution Model 232

K.F. ALBRECHT, W. MENDE, M. PESCHEL
Chain structures in 1-st order differential equations 236

B. HEINRITZ, TH. BLEY
State Models - An appropriate tool for improving the efficiency of
biotechnical processes 241

H. SCHILLING
Imigrating and Emigrating organisms in a finite Volterra World 245

A. ENGEL
Discretness in a continous model of biological evolution 248

H. MALCHOW
Dissipative structures in an ionic Lotka-Volterra type chemical
reaction system 252

L. SCHIMANSKY-GEIER, A.S. MIKHAILOV
Effect of fluctuations on front propagation in nonequilibrium
systems 258

Late Paper:

W. MENDE
The evolon growth model and its application to natural growth
processes 261