

Contents

Part I	Introduction	
Introductory Remarks. By G. Mayer-Kress (With 4 Figures)		2
Part II	General Theory, Mathematical Aspects of Dimensions, Basic Problems	
The Characterization of Fractal Measures as Interwoven Sets of Singularities: Global Universality at the Transition to Chaos By I. Procaccia (With 10 Figures)		8
Fractal Measures (Their Infinite Moment Sequences and Dimensions) and Multiplicative Chaos: Early Works and Open Problems By B.B. Mandelbrot		19
On the Hausdorff Dimension of Graphs and Random Recursive Objects. By R.D. Mauldin		28
Chaos-Chaos Phase Transition and Dimension Fluctuation By Y. Aizawa (With 9 Figures)		34
Hausdorff Dimensions for Sets with Broken Scaling Symmetry By D.K. Umberger, G. Mayer-Kress, and E. Jen (With 5 Figures)		42
Scaling in Fat Fractals. By J.D. Farmer		54
Part III	Numerical and Experimental Problems in the Calculation of Dimensions and Entropies	
Lorenz Cross-Sections and Dimension of the Double Rotor Attractor By E.J. Kostelich and J.A. Yorke (With 3 Figures)		62
On the Fractal Dimension of Filtered Chaotic Signals By R. Badii and A. Politi (With 5 Figures)		67
Efficient Algorithms for Computing Fractal Dimensions By F. Hunt and F. Sullivan (With 2 Figures)		74

Using Mutual Information to Estimate Metric Entropy By A.M. Fraser (With 3 Figures)	82
--	----

Part IV	Computation of Lyapunov Exponents
----------------	--

Intermediate Length Scale Effects in Lyapunov Exponent Estimation By A. Wolf and J.A. Vastano (With 4 Figures)	94
Comparison of Algorithms for Determining Lyapunov Exponents from Experimental Data By J.A. Vastano and E.J. Kostelich (With 5 Figures)	100
A Measure of Chaos for Open Flows By R.J. Deissler and K. Kaneko (With 1 Figure)	108

Part V	Reliability, Accuracy and Data-Requirements of Different Algorithms
---------------	--

An Approach to Error-Estimation in the Application of Dimension Algorithms. By J. Holzfuss and G. Mayer-Kress (With 7 Figures)	114
Invisible Errors in Dimension Calculations: Geometric and Systematic Effects By W.E. Caswell and J.A. Yorke (With 10 Figures)	123
Methods for Estimating the Intrinsic Dimensionality of High- Dimensional Point Sets. By R.L. Somorjai	137

Part VI	Analysing Spatio Temporal Chaos
----------------	--

Characterizing Turbulent Channel Flow By A. Brandstater, H.L. Swinney, and G.T. Chapman	150
Characterization of Chaotic Instabilities in an Electron-Hole Plasma in Germanium By G.A. Held and C.D. Jeffries (With 5 Figures)	158
Instabilities, Turbulence, and the Physics of Fixed Points By M. Duong-van (With 5 Figures)	171

Part VII	Experimental Results and Applications
-----------------	--

Determination of Attractor Dimension and Entropy for Various Flows: An Experimentalist's Viewpoint By J.G. Caputo, B. Malraison, and P. Atten (With 13 Figures)	180
---	-----

Transition from Quasiperiodicity into Chaos in the Periodically Driven Conductivity of BSN Crystals By S. Martin and W. Martienssen (With 5 Figures)	191
Dimension and Entropy for Quasiperiodic and Chaotic Convection By H. Haucke, R.E. Ecke, and J.C. Wheatley (With 11 Figures)	198
Experimental Study of the Attractor of a Driven Rayleigh- Bénard System. By J. Stavans, S. Thomae, and A. Libchaber (With 4 Figures)	207
Dimension Measurements from Cloud Radiance By P.H. Carter, R. Cawley, A.L. Licht, J.A. Yorke, and M.S. Melnik (With 5 Figures)	215
Chaos in Open Flow Systems By K.R. Sreenivasan (With 7 Figures)	222
Lasers and Brains: Complex Systems with Low-Dimensional Attractors. By A.M. Albano, N.B. Abraham, G.C. de Guzman, M.F.H. Tarroja, D.K. Bandy, R.S. Gioggia, P.E. Rapp, I.D. Zimmerman, N.N. Greenbaun, and T.R. Bashore (With 6 Figures)	231
Evidence of Chaotic Dynamics of Brain Activity During the Sleep Cycle. By A. Babloyantz (With 2 Figures)	241
Problems Associated with Dimensional Analysis of Electroencephalogram Data By S.P. Layne, G. Mayer-Kress, and J. Holzfuss (With 8 Figures)	246
Index of Contributors	257