

Contents

Part I. *Introduction*

Pattern Formation and Pattern Recognition –
An Attempt at a Synthesis. By H. Haken (With 10 Figures) 2

Part II. *Temporal Patterns: Laser Oscillations and Other
Quantum-Optical Effects*

Atomic Cooperation in Quantum Optics: Superfluorescence and
Optical Bistability. By R. Bonifacio and L.A. Lugiato
(With 9 Figures) 16

Experimental Aspects of Transition Phenomena in Quantum Optics
By F.T. Arecchi (With 13 Figures) 28

Laser with Saturable Absorber. Fluctuations and Stability
By S.T. Dembiński (With 14 Figures) 43

○ Part III. *Pattern Formation in Fluids*

Patterns of Convection in Plane Layers and in Spherical Shells
By F.H. Busse (With 7 Figures) 56

Laserlike Approach to the Dynamics of the Rayleigh-Bénard and
the Soret-Driven Instabilities. By V. Degiorgio (With 3 Figures) 64

Phase Locking in the Oscillations Leading to Turbulence
By J.P. Gollub and S.V. Benson (With 7 Figures) 74

○ Part IV. *Turbulence and Chaos*

A Simplified Theory of Intermittent Fully-Developed Turbulence
By H. Mori and H. Fujisaka (With 3 Figures) 82

Chaos and Its Description. By K. Tomita (With 3 Figures) 90

Part V. *Pattern Recognition and Pattern Formation in Biology*

Figure-Ground Discrimination by the Visual System of the Fly
By W. Reichardt (With 18 Figures) 100

A Theory of Drug Induced Visual Hallucination Patterns By J.D. Cowan and G.B. Ermentrout (With 3 Figures)	122
Physiological Mechanisms for the Perception of Random Dot Moiré Patterns. By L. Glass (With 4 Figures)	127
Similarities Between Pattern Formation and Pattern Recognition (Interpretation) During Biological Development By H. Meinhardt (With 6 Figures)	135
Electrical Effects in Nonlinear Physico-Chemical Systems: Field Chemical Wave Interaction and Bio-Self Electrophoresis By R. Larter, S. Schmidt, and P. Ortoleva (With 4 Figures)	144
Patterns in the Immune System. By P.H. Richter (With 12 Figures)	155
The Oscillatory Basis of Cell Energy Metabolism By E.E. Sel'kov (With 4 Figures)	166

Part VI. Pattern Recognition and Associations

Recent Advances in Syntactic Pattern Recognition By K.S. Fu (With 1 Figure)	176
Abduction of Semantic Patterns. By U. Grenander (With 3 Figures)	186
Representation and Processing of Associations Using Vector Space Operations. By T. Kohonen (With 5 Figures)	199

Part VII. Pattern Formation in Ecology, Sociology and History

Non-Uniform Stable Solutions to Reaction-Diffusion Equations: Applications to Ecological Pattern Formation By S.A. Levin (With 1 Figure)	210
Socioeconomic Inequalities: Adaptation and Application of a Theory of Biological Pattern Formation. By A. Gierer (With 6 Figures)	223
Systems and Changes of Systems in History By A. Nitschke (With 6 Figures)	234

Part VIII. General Approaches

Bifurcation and Nonlinear Focusing. By A.C. Newell (With 2 Figures).....	244
Thermodynamics of Nonequilibrium Processes By J. Keizer (With 1 Figure)	266
Growth of Fluctuations in Thermodynamically Unstable Systems By K. Kawasaki (With 3 Figures)	278
Evolution of Systems. Time Scaling and Scaling Factors By A. Pacault and A. Marchand (With 8 Figures)	289

<i>Index of Contributors</i>	305
------------------------------------	-----

