

CONTENTS

ASPECTS OF NON-EQUILIBRIUM QUANTUM STATISTICAL MECHANICS: AN INTRODUCTION by William C. Schieve

I.	Introduction	1
II.	The Generalized Master Equation.	9
III.	Subdynamics - The $\tilde{\pi}$ Projection	23
IV.	Quantum Kinetics of Dilute Systems	34
	References	47

TRANSFORMATION THEORY AND PHYSICAL PARTICLE DESCRIPTION OF DISSIPATIVE SYSTEMS by Claude George

I.	Introduction	53
II.	Schrödinger and Heisenberg Representations	55
III.	Transformation Theory.	58
IV.	Star-Unitary Transformation.	61
V.	Properties of the Λ_p -Transformation.	64
VI.	Comparison with Known Results.	70
VII.	General Conclusions.	74
	References	77

KINETIC THEORY OF GASES IN GENERAL RELATIVITY THEORY by Jürgen Ehlers

I.	Introduction	78
II.	Remarks about General Relativity Theory.	79
III.	Basic Concepts and Laws of Relativistic Kinetic Theory	82
IV.	Remarks about Special Solutions and Approximation Methods for Non-Equilibrium Situations	94
	References	103

COMPUTER EXPERIMENTS ON SELF-GRAVITATING SYSTEMS by Richard Miller

I.	Introduction	106
II.	Spiral Galaxies in a Computer.	108
	References	125
III.	Numerical Experiments on Pair Correlations and on "Thermodynamics"	126
	References	144

PROPAGATION OF WAVES IN DISCRETE MEDIA, HARMONIC, ANHARMONIC, AND DEFECTIVE by Elliott Montroll

	Foreword	145
I.	Comparison of Propagation of Small Amplitude Waves in Continuous and One-Dimensional Discrete Media.	146
II.	Equations of Motion and Dispersion Relations in 2D and 3D Harmonic Lattices	155
III.	Propagation of a Pulse in a Two Dimensional Anharmonic Lattice.	165

VI

IV.	Effect of Defects on Lattice Vibrations.	169
V.	Ergodicity and Permanent Waves in Anharmonic One-Dimensional Chains	176
	References	202

STOCHASTIC BEHAVIOR IN NON-LINEAR OSCILLATOR SYSTEMS by Joseph Ford

I.	Introduction	204
II.	The Model.	206
III.	Stochasticity for Large Nonlinearity	211
IV.	Stochasticity for Small Nonlinearity	222
V.	Exponentiating Trajectories.	228
VI.	Area Preserving Mappings	232
VII.	Pathology of Area-Preserving Mappings.	237
VIII.	Conclusions.	245
	References	246

NONEQUILIBRIUM THERMODYNAMICS, DISSIPATIVE STRUCTURES, AND BIOLOGICAL ORDER by Jack S. Turner

	Forward.	248
	Introduction	249
PART ONE: Thermodynamics of Irreversible Processes: The Origin and Stability of Nonequilibrium Order		
	Introduction	253
I.	Nonequilibrium Thermodynamics. The Linear Theory.	255
II.	Nonlinear Thermodynamics	268
III.	Dissipative Structures	279
IV.	Fluctuations	300
PART TWO: Application to Biology: The Control of Metabolic and Biosynthetic Processes		
	Introduction	313
V.	Transfer of Chemical Energy in Living Cells--Glycolysis.	314
VI.	The Control of Protein Biosynthesis.	325
	Appendices	335
	References	340