## **CONTENTS**

1. STATISTICAL MECHANICS	
Microscopic Dynamics and Macroscopic Laws	3
by Joel L. Lebowitz	
Time, Probability, and Dynamics	21
by B. Misra and I. Prigogine	
Correlations, Fluctuations, and Turbulence in a Rarefied Gas	45
by Harold Grad	
Sufficient Conditions to Single Out the Gibbs Measure from Other Time-Invariant Measures	71
by Sheldon Goldstein	
How Random Is a Coin Toss?	79
by Joseph Ford	
2. DYNAMICS	
One Mechanism for the Onsets of Large-Scale Chaos in Conservative and Dissipative Systems	95
by Robert H. G. Helleman and Robert S. MacKay	
Period Doubling as a Universal Route to Stochasticity	127
by Robert S. MacKay	
Some Order in the Chaotic Regimes of Two-Dimensional Maps	135
by John M. Greene	
Renormalization Approach to Nonintegrable Hamiltonians	149
by D. F. Escande	

xiii

xiv	Contents
Chaotic Motion Along Resonance Layers in Near-Integrable Hamiltonian Systems with Three or More Degrees of Freedom	179
by M. A. Lieberman and Jeffrey L. Tennyson	
Stochasticity and Order in a Linear Quasi-Periodic Differential Equation	213
by A. Salat and J. Tataronis	
Gravitational Examples of Nondeterministic Dynamics	227
by V. G. Szebehely	
Instabilities in Planetary Systems	235
by R. O. Vicente	
3. PLASMA PHYSICS	
Multidimensional Canonical/Symplectic Maps for Gyroresonance Crossings	247
by Celso Grebogi and Allan N. Kaufman	
Stochasticity, Superadiabaticity, and the Theory of Adiabatic Invariants and Guiding Center Motion	257
by Daniel H. E. Dubin and John A. Krommes	
Ray Ergodicity and Its Consequences for Plasma Heating, Stability, and Emission	281
by Edward Ott	
Renormalized Plasma Turbulence Theory	301
by C. W. Horton, Jr.	
Turbulent Plasma Response in a Stochastic Orbit Regime	319
by K. Molvig, J. P. Freidberg, R. Potok, S. P. Hirshman, J. C. Whitson, and T. Tajima	
New Integrable Nonlinear Evolution Equations Leading to Exotic Solitons	345
by Yoshi H. Ichikawa, Kimiaki Konno, and Miki Wadati	
On Davydov's α-Helix Solitons	367
by J. M. Hyman, D. W. McLaughlin, and A. C. Scott	

Contents	XV
4. BEAM-BEAM INTERACTION	
Experimental Observations and Theoretical Models for Beam-Beam Phenomena	397
by S. Kheifets	
Resonance Streaming in Electron-Positron Colliding Beam Systems	427
by Jeffrey L. Tennyson	
Global Stability in a Four-Dimensional Mapping Model of Colliding Cylindrical Beams	453
by Tassos C. Bountis, Charles R. Eminhizer, and Robert H. G. Helleman	
Statistical Description of the Chirikov-Taylor Model in the Presence of Noise	471
by A. B. Rechester, M. N. Rosenbluth, R. B. White, and C. F. F. Karney	
Author Index	485
Subject Index	491