## -187-

## TABLE OF CONTENTS

## PART I

## FOUNDATIONS OF STATISTICAL MECHANICS

The Classical Paradoxes	Page 2
The H-Theorem Reversability Paradox Liouville's Theorem Poincare's Recurrence Theorem	3 3 4 7
A Simple Model with the Same Difficulties	10
The H-Theorem Reversability Paradox Recurrence Paradox Probabilistic Analysis The Paradoxes Resolved	13 13 14 15 23
A Second Model, but Easier	23
The Liouville Equation The Master Equation The Two Basic Approaches They are different But not very	28 30 32 41 42
The Boltzmann Equation for a Gas	. 47
Statistical Approach The Master Equation	51 56
A Simpler Model of a Gas	59
The Master Equation Contracted Distributions Lo, the Boltzmann Equation Chaos Chaotic Distributions The H-Theorem The Maxwell Distribution A Class of Chaotic Distributions The Linear Boltzmann Equation The Linearized Boltzmann Equation Hilbert's Procedure Relation to the Master Equation	59 60 63 64 69 71 74 80 84

# TABLE OF CONTENTS (Continued)

## PART II

## STOCHASTIC MODELS

Stochastic Model Related to Telegrapher's Equation	Page 102
A Discrete Random-Walk	103
Limiting Case Monte Carlo	108 109
A Continuous Model ,	110
The Poisson Process Solution of the Telegrapher's Equation Related Equations in Higher Dimensions	110 113 114
Asymptotic Behavior of Eigenvalues of the Laplacian	123
Relation to Diffusion Equation Stochastic Interpretation The Principle of Not Feeling the Boundary for Early Times Use of a Tauberian Theorem Advantages of this Approach	124 125 126 127 130
Brownian Motion	1.31
The Chapman-Kolmogoroff Equation Solutions of this Equation Wiener Measure A Functional, Its Distribution, and a Related	132 133 134
Differential Equation Stochastic Interpretation The Fundamental Solution Eigenvalues of the Schroedinger Equation Monte Carlo	140 142 147 148 155
Potential Theory	158
Average Time a Brownian Particle Spends in a Region $\Omega$ .  Difference Between Space and the Plane Distribution of Sojourn Times A Related Integral Equation Probabilistic Expression for the Capacitory Potential The Capacity Two Dimonsions Another Measure Based on the Chapman-Kolmovoroff Equation	161 163 166 169 173 181 183