

CONTENTS

Preface

v

Part I. STATIC FIELD SCATTERING

1. Classical Scattering and Quantum Formulation	1
2. Partial Wave Analysis	9
3. Scattering Matrix and Bound States	17
4. Resonance Effects	26
5a. Normalization of Continuum States	35
5b. Coulomb Scattering	40
6. Integral Equation Formulation	45
7. Variational Methods for Phase Shifts	50
8. Variational Methods for Scattering Amplitudes	60
9. Bounding Principle for Scattering Length	67
10. Nonspherical Potential Fields	73

Part II. ELECTRON-ATOM COLLISIONS

11. Formulation of Many-Channel Problem	82
12. Role of Pauli Principle	90
13. Integral Expression for Scattering Amplitude	95
14. Born, Bethe, and Oppenheimer Approximations	103
15. Variational Methods	115
16. Close Coupling Method	124
17. Ionization	133
18. Resonances and Compound Atom States	142
19. Threshold Behavior of Cross Sections	152
20. Anomalous Threshold Behaviors	160

Part III. ATOM-ATOM COLLISIONS

21. General Kinematic Considerations	168
22. Expansion in Molecular States	175
23. Identical Nuclei and the Pauli Principle	183
24. Impact Parameter Method and Perturbation Solutions	192
25a. Unitarized Approximation	199
25b. Variational Principle for Time-Dependent Case	203

vii

Contents

26. Coupled Equations for Proton–Hydrogen Collisions	205
27. Crossing of Potential Energy Curves	213
28. Adiabatic Symmetric Charge Transfer	222
29. General Formulation for Rearrangement Collisions	230
30. Charge Transfer in Fast Collisions	237
Index	243