CONTENTS

List of Contributors vii
Preface ix
Contents of Other Parts xi

IX THEORETICAL ANALYSIS

IX.A Models of Light Nuclei

M. Harvey and F. C. Khanna

I. Introduction 4
II. Fundamentals 6
III. Independent Particle Models and the *G* Matrix 17
IV. The Spherical Shell Model 29
V. The Deformed Shell Models 50
VI. Harmonic Oscillator Models 63
VII. Nuclear Cluster Models 84
References 91

IX.B Models of Heavy Nuclei

J. O. Rasmussen

I. Introduction 97
II. Fermi Gas Model 99
III. Liquid-Drop Model Mass Equations 102
IV. The Shell Model 105
V. Nucleon Orbitals in Nonspherical Potentials 114
VI. The Effective Force: Two-Particle Configurations 124
VII. Pairing-Force Models and Quasi-Particles 138
VIII. Nuclear Rotational Motion 147
IX. Nuclear "Vibrational" and Quasi-Particle Excitations 157
References 173

IX.C New Approaches in Resonance Reactions

D. Robson

I. Introduction 180
II. The Concept of Resonance 182
III. Nuclear Resonance Theories 185
IV. Reaction Channels and Channel Surfaces 197
V. Angular Dependence of Reaction Amplitudes 221
VI. Energy Dependence of Reaction Amplitudes 231
References 246

IX.D Inelastic Scattering and Charge Exchange

V. A. Madsen

I. Theory of Effective Interaction in Nuclear Scattering 251
II. Coupled-Channel Formalism 255
III. Distorted Wave Born Approximation (DWBA) 275
IV. Core Polarization Effects 277
V. Rearrangement Coupling 284
VI. Collective Model 291
VII. Applications 293
Appendix—Projectile Effective Interaction 312
References 314

IX.E One- and Two-Nucleon Transfer Reactions

Norman K. Glendenning

I. Introduction 319
II. Simplest Form of DWBA for (d,p) Reactions 320
III. Nonlocal and Finite-Range Effects 326
IV. Adiabatic Model for the Deuteron Optical Potential 329
V. Form Factors Related to Nuclear Structure 330
VI. Higher Order Processes 332
VII. Two-Nucleon Transfer Reactions 335
General References 342
References 343

Author Index 345
Subject Index 354