

# Contents

<b>Foreword</b>	vii
<b>Introduction</b>	3
<b>Chapter I The Rediscovery of a Mathematical Tool</b>	5
I.1 Max Born's Interpretation of Heisenberg's Quantum Condition	5
I.2 The Development of Matrix Calculus	13
I.3 Early Applications of Matrix Methods in Physics	34
I.4 Born's New Collaborator: Pascual Jordan	44
<b>Chapter II Matching the Tools and the Task</b>	61
II.1 The Programme of Matrix Mechanics	62
II.2 Operations with Matrices	65
II.3 Dynamical Laws and Energy Conservation	72
II.4 An Example of Discrete Mechanics: The Oscillator	80
II.5 Preliminary Remarks on Radiation	87
<b>Chapter III Completion of the Matrix Scheme</b>	91
III.1 The Three-Man Collaboration	92
III.2 Towards a New Perturbation Theory	103
III.3 Several Degrees of Freedom and Degeneracy	109
III.4 Born's <i>Idée Fixe</i> and a Letter to Niels Bohr	118
III.5 The Eigenvalue Problem and the Transformation to Principal Axes	121
III.6 Continuous Spectra and the Significance of the Transformation Matrix	129
<b>Chapter IV The Success of Matrix Mechanics</b>	139
IV.1 The Treatment of Dispersion Phenomena	140
IV.2 Fluctuations in Cavity Radiation	149

IV.3	The Conservation of Angular Momentum	157
IV.4	Wolfgang Pauli's Conversion	166
IV.5	The Solution of the Hydrogen Problem	174
IV.6	The Problems of Intensities and the Diatomic Molecule	185
<b>Chapter V Modifications and Extensions of Matrix Mechanics</b>		<b>195</b>
V.1	Nonmechanical Stress versus Spin	196
V.2	Field-Like Representation of Quantum Mechanics	204
V.3	The Operator Mechanics	220
V.4	Multiply Periodic Systems: Action-Angle Variables and the Method of Complex Integration	247
V.5	The Electron Spin, Fine Structure and Anomalous Zeeman Effects	266
V.6	Key to the Helium Problem	282
<b>References</b>		<b>303</b>
<b>Author Index</b>		<b>331</b>