

Contents

<i>Preface</i>	<i>xi</i>
<i>List of abbreviations</i>	<i>xiii</i>
<i>List of plates</i>	<i>xiv</i>
I Introduction: Maxwell and the history of physics	1
II Formative influences	13
1 The scientific culture of Edinburgh	13
2 Cambridge: the Mathematical Tripos	19
3 Philosophical education: Edinburgh and Cambridge	27
III Edinburgh physics and Cambridge mathematics	37
1 Casting light on colours	37
2 On Saturn's rings	48
3 Physics and metrology	57
IV Physical and geometrical analogy	71
1 The language of field theory: Faraday and Thomson	71
2 Physical analogy and field theory	81
V Models and mechanisms	91
1 Mechanics and molecules: the kinetic theory of gases	91
2 Ether models: the electromagnetic theory of light	98
VI Dynamical and statistical explanation	113
1 The dynamical theory of the electromagnetic field	113
2 Statistical physics	124
3 The 'demon' and the second law of thermodynamics	134
VII Geometry and physics	145
1 Vectors: the geometry of field theory	145
2 'Geometry of position': topology and projective geometry	154

Contents

VIII Physical reality: ether and matter	162
1 Ether, field, and gravity	162
2 Molecules	175
IX Physics and metaphysics	188
1 Matter and dynamics	188
2 Materialism and determinism	197
<i>Notes</i>	209
<i>Index</i>	224