

Contents

OTHER TITLES IN THE SERIES IN NATURAL PHILOSOPHY	ii
PREFACE	vii
CHAPTER 1. THE DESCRIPTION OF POLARIZED LIGHT	1
1.1. <i>Introduction</i>	1
1.2. <i>On the Nature of Light</i>	3
1.3. <i>Mathematical Methods</i>	17
1.3.1. Introduction	17
1.3.2. The Jones Vector	22
1.3.3. The Stokes Parameters	25
1.3.4. The Mueller Calculus	35
1.3.5. The Poincaré Sphere	39
1.4. <i>Conclusion</i>	41
CHAPTER 2. SOME INTERACTIONS OF LIGHT AND MATTER	43
2.1. <i>Introduction</i>	43
2.2. <i>Reflection</i>	44
2.2.1. Reflection by Dielectrics	49
2.2.2. Reflection by Metals	64
2.3. <i>Transmission</i>	70
2.3.1. Isotropic Media	70
2.3.2. Anisotropic Media	73
2.4. <i>Absorption</i>	86

CONTENTS

CHAPTER 3. OPTICAL ELEMENTS USED IN POLARIZATION STUDIES	88
3.1. <i>Introduction</i>	88
3.2. <i>Polarizers</i>	90
3.2.1. Birefringent Polarizers	92
3.2.2. Reflection Polarizers	97
3.2.3. Dichroic Polarizers	99
3.3. <i>Retarders</i>	100
3.3.1. Birefringent Retarders	101
3.3.2. Reflection Retarders	110
3.4. <i>Other Devices</i>	113
CHAPTER 4. MEASUREMENT OF THE STATE OF POLARIZATION	118
4.1. <i>Introduction</i>	119
4.2. <i>Measurement of the State of Polarization</i>	120
4.2.1. General Considerations	120
4.2.2. Linear Polarization Measurement	131
4.2.3. Elliptical Polarization Measurement	150
4.2.4. Spectral Measurements	153
CHAPTER 5. THE ROLE OF POLARIZATION IN OPTICAL INSTRUMENTATION	155
5.1. <i>Introduction</i>	156
5.2. <i>Intensity Control</i>	157
5.3. <i>Bandwidth Control</i>	161
5.4. <i>Polarizational Labelling</i>	165
5.5. <i>Polarizing Effects in Measuring Instruments</i>	170
APPENDIX I. HISTORICAL NOTES ON POLARIZATION	173
APPENDIX II. MATRIX MULTIPLICATION	177
REFERENCES	179
INDEX	183