

CONTENTS



Contents

Subject	Page
Abstract	i
CHAPTER (I)	
INTRODUCTION	
1.1 Birefringence	1
1.2 Birefringent crystals	4
1.3 Propagation of plane waves in uniaxial crystals	5
1-4 Previous work	12
1-5 Aim of the present work	23
CHAPTER (II)	
THEORY AND	
MEASUREMENT OF	
NATURAL BIREFRINGENCE	
2.1 The superposition of waves	25
2.2 Two beam interference by the complex representation of	27
light waves	
2.3 Interference of polarized light	30

2.4 Crystal Plates Between two Crossed Polarizers	34	
2.5 Interference with uniaxial crystal plate	38	
2.5-1 Analyzer and polarizer are parallel (χ =0).	40	
2.5-2 Analyzer and polarizer are perpendicular ($\chi = \pi/2$)	41	
2.6 Dispersion	42	
2.7 Cauchy's Dispersion Equation	45	
2.8 Birefringence dispersion of an anisotropic material	47	
2.9 Birefringence for an anisotropic plate of changing thickness	48	
2.10 Experimental work and discussion	49	
CHAPTER (III)		
THEORY AND		
MEASUREMENT OF		
INDUCED BIREFRINGENCE		
3.1 Introduction	61	
3.2 Physical effects of induced birefringence	62	
3.3 Theory of induced birefringence	65	
3.4 Experimental work and discussion	68	
3.4.1 Strain distribution and Young's modulus	70	
3.4.2 Measurement of birefringence and its dispersion	77	
3.5.1 Theory of natural-induced birefringence	81	

3.5.2 Experimental Work and Discussion	85
conclusion	89
References	92