

Table of contents

List of figures	xxv
List of tables	xxxiii
Nomenclature	xxxiii
1 Introduction	1
1.1 Light and Optical field	1
1.2 Diffraction	4
1.3 Fresnel and Fraunhofer integrals	5
1.3.1 Discrete Fourier transform	8
1.3.2 Angular spectrum method	9
1.4 Coherence	13
1.5 Holography	16
1.5.1 Off-axis holography	18
1.5.2 Phase shifting Digital Holography	19
1.6 Polarization digital holography	20
1.7 Optics with randomness	23
1.7.1 Propagation of coherent light through randomness: Laser Speckle	23
1.7.2 Adaptive optics	25
1.7.3 Optical phase conjugation	27

1.7.4	Schemes based on Transmission matrix(TM)	27
1.7.5	Correlation optics	29
1.7.6	Polarization Speckle	35
2	A compact and lens less digital holography setup for polarimetric analysis of spatial light modulator	43
2.1	Introduction	43
2.2	Methodology	48
2.3	Results and Discussion	52
2.4	Conclusion	58
3	Single shot and speckle free reconstruction of orthogonal polarization modes with a tuneable beam displacer	61
3.1	Introduction	61
3.2	Theory	65
3.3	Experiment	71
3.4	Results and Discussion	73
3.5	Conclusion	82
4	Randomness assisted in-line holography with deep learning	83
4.1	Introduction	83
4.2	Theory and Methodology	86
4.3	Experimental recording	90
4.3.1	Description of Auto Encoder model	94
4.4	Conclusion	104
5	Ghost diffraction	105
5.1	Introduction	105

5.2	Methodology	107
5.3	Experiment	113
5.4	Results and Discussion	114
5.5	Ghost Polarimetry	120
5.6	Conclusion	123
6	Conclusion and future plan	125
6.1	Conclusion	125
6.2	Future plan	127
	References	129