

Contents

<i>Preface</i>		i
<i>Acknowledgement</i>		ii
<i>Contents</i>		iii
<i>Summary</i>		iv
Chapter 1	Detection of Defects in Woven Fabric	
1.1	Introduction	1
1.2	Types of commonly occurring defects in woven fabric.	4
1.3	Defect detection techniques	11
1.4	Detection of defect by Fourier transform analysis	12
1.5	Image processing techniques for defect detection in fabric	15
1.5.1	Fabric defect detection using statistical approach	16
1.5.2	Defect detection in fabric using morphological operation	19
1.6	Technique of defect detection using Gabor and wavelet transform	20
1.7	Application of neural network for defect detection in fabric	23
1.8	Conclusions	25
	References	27
Chapter 2	Optical Fourier Transform Technique for the Detection of Defects in Woven Fabric	
2.1	Introduction	33
2.2	Two dimensional Fourier transform analysis of fabric pattern	35
2.2.1	Power spectrum of fabric pattern	39
2.3.1	Parameters of fabric structure from the power spectrum plot	41
2.3.2	Determination of fabric parameters: yarn diameter, warp and weft periods	42
2.4	Effects of defects on power spectrum	44
2.5	Optoelectronic system for the measurement of power spectrum	47

2.6	Experimental Results	48
2.7	Analysis of results	59
2.8	Optical spatial filtering and reconstruction of images for defect detection	61
2.9	Experimental results	64
2.10	Discussions and conclusions	70
	References	72
Chapter 3	Detection of Defects in Fabric by Joint Transform Correlation Technique	
3.1	Introduction	73
3.2	Joint transform correlation technique	74
3.3	JTC Technique for defect detection in fabric using defects as reference.	81
3.3.1	Simulation Results	83
3.4	JTC technique for defect detection in fabric using defective fabric as reference	87
3.4.1	Simulation results	93
3.5	Conclusion	96
	References	97
Chapter 4	Detection of Defects in Fabric by Laser Based Morphological Image Processing	
4.1	Introduction	99
4.2	Binary morphological image processing	101
4.3	Morphological operation on direct image of fabric	104
4.3.1	Experimental setup for morphological image processing on image of test fabric	105
4.3.2	Experimental results for extracting defect from image of fabric	107

4.4	Defect detection by morphological operations on spatially filtered image of fabric	113
4.4.1	Experimental results on morphological image processing on spatially filtered images of test fabrics	114
4.5	A technique of optoelectronics implementation of morphological operations	120
4.6	Conclusion	123
	Reference	125
Chapter 5	Detection of Defects in Woven Fabric by Rank Order Operator	
5.1	Introduction	127
5.2	Binary convolution operation	129
5.3	Binary nonlinear rank order filter	129
5.4	Choice of the proper rank of the rank order operator	130
5.5	Laser based optoelectronic system for rank order filtering operation	132
5.6	Experimental results and discussions	133
5.7	Conclusion	135
	References	137
Chapter 6	Detection of Defects in Fabric Using Linear Associator Model of Memory	
6.1	Introduction	138
6.2	Defect detection in fabric using memory models	142
6.3	Linear associator model	142
6.4	Simulation and results	146
6.5	Conclusions	149
	Appendix	154
	References	162
	<i>Epilogue</i>	164