

CONTENTS

1 INTRODUCTION	1
1.1 Basic symbols	5
2 PRELIMINARY CONCEPTS FROM ALGEBRA, FUNCTIONAL ANALYSIS AND PROBABILITY THEORY	9
2.1 Preliminaries from matrix theory	10
2.2 Preliminaries from reproducing kernel Hilbert spaces	27
2.3 Preliminaries from probability theory	39
3 FUNDAMENTAL NOTIONS FROM ESTIMATION THEORY	57
3.1 Sufficient statistics	65
3.2 Inequalities of the estimation theory	81
3.2.1 One-dimensional (scalar) parameters	81
3.2.2 Multidimensional (vector) parameters	96
4 ESTIMATORS IN THE CASE OF LARGE SAMPLES	108
4.1 The moment method	110
4.2 Consistency of maximum-likelihood estimators	124
4.3 Asymptotic normality and efficiency of maximum-likelihood estimators	137
5 LINEAR AND QUADRATIC ESTIMATORS	141
5.1 Fundamental linear models	145
5.2 Universal linear model	154
5.3 Theorems on equivalence	161
5.4 Estimation of the factor σ^2	165
5.5 The full class of normal equations matrices and the Pandora-box matrix	172
5.6 Estimators of variance components	180

5.7 Uniformly best linear unbiased estimators	203
6 NORMALITY OF OBSERVATION VECTORS	207
6.1 Fundamental regular models	210
6.2 Quadratic functions of random vectors	217
6.3 The universal model	222
6.4 Estimation of a non-linear function of first order parameters	233
6.5 An estimated covariance matrix in estimating the first order parameter	250
6.6 Estimators of second order parameters variance components	260
7 SOME OTHER TYPES OF ESTIMATORS	265
7.1 The Wald approach to the estimation problem	267
7.2 Shrinkage of an unbiased estimator. A ridge estimator	280
7.3 Robust estimators	289
7.4 The Bahadur approach to estimation problems	305
8 CONCLUSION	315
REFERENCES	316
SUBJECT INDEX	322