Distribution of Test Statistics: Exact and Asymptotic, Null and Non-Null
A. M. MATHAI (Editor)
American Sciences Press, Columbus, Ohio, 1990. 182 pp. $89.75
ISBN 0 935 95020 6

This special volume covers the various aspects of exact and asymptotic, null and non-null distributions of test statistics connected with tests of hypotheses on one or more multivariate normal populations. Under a broad division of research areas, individual authors put their own emphasis on particular topics. The book consists of eight papers covering the exact, approximate and asymptotic null distributions of test statistics; non-null distributions and power function studies for local and general alternatives; various techniques that are available for the study of distribution problems, including Wilk's type integral equations; invariant polynomials and general approaches, including the applications of generalized special functions such as G and H-functions; generalization to elliptically contoured distributions; and some common structures in geometric probabilities and multivariate statistical analysis. The articles are rich in review material and therefore the book is recommended to young research workers as well as to others who would like to know more about these topics.

J. SZTRIK

Identifiability, Recursive Identification and Spaces of Linear Dynamical Systems
B. HANZON
Centrum voor Wiskunde en Informatica, Amsterdam, 1990. Part I: 223 pp. Dfl 58, Part II: 190 pp. Dfl 48.
ISBN 9 061 96371 0

One would have thought that the mathematical and statistical analysis of linear systems would have been exhausted by now and researchers would be making inroads into the non-linear area, as indeed they are. However, the exhaustion is not complete; there are those who see gain in using more abstract and rigorous mathematics to find deeper theorems and subsequent generalizations.

The two works under review are two softback volumes, with Part I beginning with a good single chapter resumé of the basics of deterministic and stochastic linear systems, including state space concepts and ARMA modelling. A chapter on the finite identifiability problem follows, whereupon the author plunges into the geometric and topological structure of collections of linear systems forming the model set. The remaining contribution to Part I is devoted to an overview of the known results arising from this differential geometric and topological approach. It is put forward that since models are abstract entities then one requires topology to take care of their qualitative aspects and some metric to distinguish them in terms of distance—their closeness! Thus one can see the motivation for the style and nature of the work presented.

Part II is concerned entirely with gradient algorithms, for recursive identification, within the Riemann metric framework, given that the collection of models posed forms a differentiable manifold. Making a key assumption about compactness of the manifold, the convergence of the parameter sequence produced by the algorithm is assured. There is of course a plethora of definitions, theorems, and propositions in typical mathematical and probabilistic vein throughout both volumes.

It is always difficult to judge from a book's title at what level the material is being presented. This title is a case in point. The subject is of course of interest to engineers, econometricians, statisticians and operational researchers. However, it has to be said that it is most unlikely to be of direct benefit to the majority of the operational research fraternity, perhaps only to a very few who are mathematically inclined and then at a fundamental research level.

W. D. RAY