Book Selection

Edited by JOHN HOUGH

Factorial Designs

B.L. RAKTOE, A. HEDAYAT and W.T. FEDERER
Wiley, U.K., 1981. 209 + xiipp. £22.25
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The authors have identified and filled a gap in the literature by providing a text devoted entirely to the concepts of factorial experimental designs. The work is devoted mainly to fractional factorial designs, which includes most of the well-known relevant results in, for example, "Statistical Design and Analysis of Experiments" by P.W.M. John (1971) or "Experimental Design" by Federer (1955), but continues to provide an account of recent developments up to now. The treatment is general, so that $2^n \times 3^m$ experiments are special cases, and the authors have deliberately adopted different notations from traditional accounts in order to obtain precision and generality. In consequence the text tends to conceal the familiarity that a reader may have with much of the material.

The main topics are orthogonal polynomial models with general replication and parameter subsets, criteria of optimality in constructing designs (eight possible criteria are given), characterization of unbiased designs, resolution and confounding, orthogonality and balancedness of designs. Designs of resolution III, IV and V are discussed in some detail. Two interesting chapters cover randomized factorial designs where random selection of a fractional replicate design removes bias in estimation of a subset of parameters due to falsely assuming that the remaining parameters are zero (negligible), and there is a chapter on search factorial designs suitable for finding that model in a given class which is correct according to a given criterion. Other chapters cover notation, linear model theory, methods for constructing designs and some algebraic topics.

The treatment is condensed and suitable for the mathematically inclined reader. There are many examples of results, nearly always from the $2^n \times 3^m$ series n,m = 0, 1, 2, ..., but none involve data. An excellent feature is that each chapter includes a long list of titles for additional reading. It would, however, have been helpful if these could have been referenced to the topics in each chapter.

This text is valuable, but not to the general O.R. practitioner nor to the statistician working in O.R. The treatment is so specialised that it will be of most use to the mathematical statistician needing to explore new techniques in experimental design.

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