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Book Reviews

Observations and Least Squares. Edward M. Mikhail, with contributions by F. Ackermann. Dun-Donelly, New York, N.Y., 1976, 497 pp., hard cover, U.S. $ 25.00.

Observations and Least Squares is a very appealing text for under graduate and advanced students of adjustment computation and for research workers in need for a handbook on adjustment algorithms. It reflects the experiences of the authors as academic teachers: Edward M. Mikhail is the professor of photogrammetry at Purdue University, U.S.A.; F. Ackermann holds a similar position at Stuttgart University, F.R.G.

The book is organised in three parts and an extensive appendix. The first part with 4 chapters (100 pages) deals with statistical concepts (probability, distributions, testing, errors, propagation). It is not intended to substitute for statistical literature but contains what is relevant in the context of adjustment computation.

The core of the book is its second part dealing in 7 chapters (on about 200 pages) with the various standard cases of adjustment. These are grouped into: (a) adjustment with conditions (observations only; indirect observations); (b) adjustment with conditions and constraints. Several methods of solving these different standard cases are discussed. Valuable facts are presented on non-linear equations, a posteriori estimates of various statistical parameters and numerical considerations.

The last part of the book addresses in three chapters (100 pages) more re-

cent techniques of adjustment. It is a "unified approach", where all stochasti entities are considered to be observations and distinctions among them are made in the co-variances only. Next, sequential data processing is discusse a method of adjustment that has become important for example in on-line photogrammetry: new observations are added to an already solved adjustmen problem. An "add-on" adjustment is performed to integrate the new (or dele undesired old) observations or constraints. The last chapter presents an intro- duction to the methods of least squares interpolation, filtering and collocatio This statistical method has been introduced into photogrammetry main- ly to solve interpolation problems. Its incorporation in the book reflects research interests of the authors.

The appendices deal on about 60 pages with a review of matrix algebra, linearisation by series expansion, rank determination of co-variance matrices and contain the most important statistical tables. A valuable bibliography wit recent books, articles and theses (in English) concludes the book.

Observations and Least Squares is excellently organized and lucidly writter Matrix notation is used throughout. A large number of numerical examples illustrate the topics of the book. In addition each part is concluded by a set of problems (solutions not included). The book reflects the approaches and adjustment concepts as they seem to be used in the U.S.A. The subject is developed with engineering and applied-science students in mind. The theo- retical foundations are thus kept at an appropriate level, while algorithmic considerations dominate. This may make the book particularly valuable to teachers of photogrammetry students and may set it apart from others on the subject.

The authors are to be congratulated on their book.

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