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András Prékopa: STOCHASTIC PROGRAMMING. Akadémiai Kiadó, Budapest and Kluwer Academic Publishers, Dordrecht 1995. 599 pages, ISBN 963-05-6872-1 (Akadémiai Kiadó), ISBN 0-7923-3482-5 (Kluwer)

It was recognised already in the fifties that for many optimization problems, arising from real-life economic, engineering, biological and medical models, the assumption of fixed completely known coefficient values is unjustified in practice. Simultanously, it was discovered that the uncertainty occurring can be successfully handled by a probabilistic approach. As a result a new field of mathematical programming theory, called the stochastic programming, arose and has developed rather quickly as an independent part of mathematical programming.

The author of the book under review is one of the best specialists in the field of stochastic programming and a lot of valuable results from stochastic programming theory belong just to him. His deep knowledge of general optimization theory, probability and mathematical statistics made use of his remarkable insight into stochastic programming.

The book is divided into 15 chapters, however according to our opinion it might be reasonable to divide it into 5 parts. The aim of the "auxiliary" parts (chapters 1, 2, 3, 6, 7) is to recall fundamental results and notions of linear programming, convex polyhedra and some well-known results of mathematical statistics and probability. Perhaps, it would be reasonable to include also an introduction to the theory of logconcave and quasi-concave probability measures (Chapter 4) to this collection. The last mentioned theory is rather new and its results were mostly obtained by the author of the book. It might be also useful to amend this part by brief surveys on convex analysis, Lipschitz functions, and on measure-theoretic foundations of the probability theory.

The remaining parts of the book deal entirely with stochastic programming problems. In particular, the next parts are devoted to mathematical models of real-life situations leading from the mathematical point of view to optimization problems with a random element. We can divide them into two subparts according to whether the solution can depend on a random element realization or must be determined without this knowledge.

If the first case occurs, then the optimal value and the optimal solution are (under general assumptions) random variables and only their statistical characteristics can be investigated. The linear programming problems with random coefficients are investigated from this point of view in Chapter 15.

If the solution is to be determined without knowledge of the random element realization, then it is necessary first to determine the decision rule. In particular, in such a case, a new deterministic optimization problem depending on the random element only through the corresponding probability measure will replace the optimization problem considered. Chapter 8 deals with some types of such deterministic problems. The problems with penalty function and some problems depending on probability measure are included there. Chapters 10 and 11 deal with the case when fulfilment of the constraints containing random element is guaranteed with a given probability or when the objective function is given by a probability function. The two-stage and multistage stochastic programming problems can be employed if the real-life situations develop in time or if at least the basic effect can be corrected by a new (say recourse) optimization problem. The book deals with these cases individually

(Chapters 9, 12, 13). All these types of problems are investigated both from the theoretical and from the numerical point of view, however mostly only for the linear case.

All up to now introduced types of stochastic programming problems are investigated under the assumption of complete knowledge of the corresponding probability measure. (The only exception is Chapter 5 dealing with the case when the probability law is given only through mathematical expectation of some random function.) However, in real-life situations this assumption is fulfilled only rarely. Consequently, a new direction (statistical approach to stochastic programming problems) arose in stochastic programming theory. The corresponding parts of stochastic programming theory as well as nonlinear models are (mostly) omitted in the book. I did not find any remark on computer programs suitable for solving at least specific stochastic programming problems. This fact is rather strange given the author's former experience with practical solution of many concrete stochastic programming problems. Perhaps, the only reason for this is that all these problems cannot be included in one monograph. However, the book is appended by Chapter 14 in which some practical tasks, leading from the mathematical point of view to stochastic programming models, are introduced.

In the end it is necessary to state that the book is written in a very understandable manner and includes an essential part of stochastic programming theory. It can be recommended not only to students and research workers but also to specialists interested in applications of stochastic programming.

Vlasta Kaňková

WORLD CONGRESS OF NONLINEAR ANALYSTS '92. Proceedings of the First World Congress of Nonlinear Analysts, Tampa, Florida, August 19–26, 1992, 4 volumes, V. Lakshmikantham (editor), 1996, 17 × 24 cm, XLVI + 3954 pages with 436 figures and 51 tables, set of volumes 1–4 DM 1.198,– ISBN 3-11-013215-X, de Gruyter Berlin New York

These four volumes comprise about 350 selected contributions presented to the *First World Congress of Nonlinear Analysts* which was held under the auspices of the International Federation of Nonlinear Analysts (IFNA). The first volume of the proceedings concerns various aspects of partial differential equations including problems in physics, fluid mechanics, combustion theory, structural mechanics, hysteresis, and atmospheric and marine sciences. Volume two incorporates a variety of problems in ordinary differential equations (deterministic and stochastic) as well as difference equations and dynamical systems. In addition, this volume includes neural networks, problems in superconductivity and microelectronic devices, computer vision and numerical and computational methods. Volume three is devoted to the theoretical aspects of nonlinear analysis such as nonlinear operators, nonconvex analysis, control theory and optimization, fixed point theory and evolution equations. Moreover, this volume also contains models in economic theory, manufacturing systems, engineering applications, chaos, bifurcation and artificial intelligence in nonlinear electronics. Finally, volume four deals with several aspects of biomathematics and ecology including biochemical systems, enviromental problems, bursting rhythms and biomedicine. The proceedings also contains papers presented at "Lyapunov's and Poincaré Centenary sessions" as well as "Round Table Meetings" in which experts from industry and academic institutions participated. The applied and theoretical mathematicians as well as scientists from other applied disciplines will be strongly interested. Volumes are not available separately.

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