

Book reviews

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Fuzzy and Multiobjective Games for Conflict Resolution

Studies in Fuzziness and Soft Computing 64.

Physica-Verlag, Heidelberg 2001.

xiii + 258 pages, 25 figures, 30 tables.

ISBN 3-7908-1360-5.

The referred book contributes to the mathematical methods which are applicable to the solution of economic and generally social problems connected with the optimization of human behaviour in the natural environment. It is possible to register, during the past decade, a regular development of applications of the fuzzy sets to the non-technical but rather more social problems of optimization and rational behaviour. This book belongs to the works which reflect this trend. It is devoted to mathematical models of optimization under the conflict of individual interests.

These problems in their deterministic (and probabilistic) form are already managed by the classical theory of games. Here, the extension of the traditional methods to the conflict situations with two relatively new phenomena is presented. These two phenomena, namely, are the multiobjectivity of the individual preferences of players and the vagueness connected with the coalition forming, expectation of the results of the game and evaluation of the achieved result. The latter of these two phenomena is modelled by means of the theory of games and fuzzy quantities.

The text of the book is divided into six main parts. In the *Introduction* a brief heuristic description of the problem is presented, a motivation of its processing is explained and also a historic overview of its development is given. The second chapter, entitled *Fundamentals of two-person noncooperative and n-person cooperative games* offers an overview of the classical deterministic concepts which are to be fuzzified in the next chapters. Attention is paid to the solution concepts, namely to the maxmin and equilibrium in the noncooperative case and to the core, nucleolus and lexicographical solutions in the cooperative one.

The following four chapters are devoted to particular topics in the centre of interests of the book. Chapter 3, *Multiobjective fuzzy two-person zero-sum games* analyses the concepts of matrix games with multiobjective and fuzzy goals and fuzzy pay-offs, and their solutions. The main type of solution of these games is the maximin principle. The following Chapter 4, *Multiobjective fuzzy two-person non-zero-sum games* extends the previous analysis to more general games with non-zero sum. The main type of solution considered here is the concept of equilibria.

Next two chapters deal with the cooperative games and their multiobjective and fuzzified modifications. Chapter 5, *Fuzzy n-person cooperative games*, is the most extensive part of the book. It deals with games with fuzzy coalitions and their least core, nucleolus and lexicographical solutions. The cooperative games with fuzzy goals and fuzzy coalition values and their solutions are considered. The last part of this chapter is devoted to fuzzy linear programming games. The last chapter which is entitled *Multiobjective n-person cooperative games* is focused on the problem of the multiobjective evaluation of the results. It analyses the cooperative games with multiple scenarios as an introduction to the problem. Further, cooperative games with multiple pay-off sets are investigated and, finally, multiobjective linear production programming games are dealt. The book is concluded with the relatively representative list of references (160 items) and the index.

The explanation of the presented theory is on a very good level. Nevertheless, the potential reader need not use difficult mathematical tools. The knowledge of the linear

algebraic concepts and of the elements of fuzzy set theory is sufficient. The presentation of particular topics is lucid and logically consistent.

A well recognizable feature of the referred book is its stress on the practical problems and their solution methods. Most of the sections are completed by paragraphs devoted to computational methods, and the theoretical explanation is combined with numerical examples.

The referred book can be recommended to a wide scale of readers. It can be useful not only for the specialists in the game theory being interested in its more realistic modifications. I believe that namely its stress on the realistic features of practical decision-making, like multiobjectivity and vagueness of preferences, makes it attractive also for those who are deeply interested in mathematical models of human behaviour. It regards, namely, the human understanding of utility and preferences, but also rational behaviour in the situations including conflicts of interests.

Milan Mareš