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NICHTLINEARE OPTIMIERUNG: NEUERE VERFAHREN. BIBLIOGRAPHIE

(Non-Linear Optimization: New Procedures. Bibliography)

Lecture Notes in Operations Research and Mathematical Systems

Springer-Verlag, Berlin, Heidelberg, New York, 1969

The methods of non-linear optimization are at present intensively used in operations research applied to the solution of economic problems. The finding of new algorithms for effectively solving extreme problems is one of the most recent research lines in the applied mathematics area. This is why the work we refer to here is of highly present interest as it supplies the readers with the description of several recent algorithms designed for the solution of non-linear programming problems.

As stated in the Introduction, this work is supplementing the well-known monograph headed "Nichtlineare Programmierung" (Springer-Verlag, 1962), written by the above mentioned authors in collaboration with W. Krelle.

The book starts with a description of the 'section plan method, developed by Kelley, Cheney and Goldstein for convex programming' which is followed by a study of convergence. The next algorithm to be described is the "tangential approximation algorithm", developed by Hartley and Hocking, which just like the section plan method, is based on the principle of convex domains linear approximation. An improved version of this procedure, in the sense of accelerating convergence, is due to Kleibohm, Veinott and Zoutendijk.

Another procedure based on linearization and described by the authors is the "approximation programming" method developed by Griffith and Stewart. The "reduced gradient method" is presented here for linear as well as for non-linear constraints. The description is made according to the works by Faure, Huard and Wolfe.

Particularly interesting is that part of the book referring to the "penalty methods". It is a well-known fact that this method was devised by R. Courant, who applied it to some variational problems pertaining to mathematical physics. The updating of this method through its utilization in non-linear programming problems is very recent. One chapter is entirely devoted to the SUMT method (Sequential Unconstrained Minimization Technique) developed by Fiacco and McCormick. Following a description of this method the primal and dual methods are set forth. The last algorithms to focuss the authors' attention are the "centre method" developed by Huard and the "method of feasible directions".

The idea of compiling an over one hundred pages bibliography, including works in the field of non-linear optimization is noteworthy. The heaviest weight is held by titles referring to non-linear programming. Titles in related areas are also present, such as: optimal control, programming on abstract spaces, the general theory of optimization. In this way the reader gets an outlook on the development of non-linear programming methods in the general framework of the optimization theory. At the same time, the reference collection is a valuable working tool made available for a wide range of research workers engrossed in optimization problems.

In concluding, we appreciate the utility of publishing this book whose major purpose — that of bestowing on the reader the opportunity to get a complete picture of the present state of non-linear programming — has, in our opinion, been fulfilled.

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