BIBLIOGRAPHY ON NONDIFFERENTIABLE
OPTIMIZATION

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PREFACE

IIASA's interest in nondifferentiable optimization (NDO) is
based on the great practical value of NDO techniques. This new
field of mathematical programming provides specialists in ap-
plied areas with tools for solving nontraditional problems aris-
ing in their work and with new approaches and ideas for treating
traditional problems. Nondifferentiable optimization is con-
cerned with the new type of optimal decision problems which have
objectives and constraints resulting from the behavior of differ-
ent complex subsystems, the solutions of auxiliary extremum prob-
lems, and so on. A common feature of these problems is that the
objectives and constraints inevitably have poor analytical
properties.

Good analytical properties are essential both for perform-
ing comprehensive theoretical analysis and for producing effi-
cient computational methods which are acceptable in practice.
The most important of these analytical properties are the exis-
tence and continuity of derivatives of various orders.

Unfortunately, derivatives are very sensitive to manipula-
tion--many standard operations and representations used in eco-
nomics or operations research destroy the property of differen-
tiability.

The absence of derivatives leads to many theoretical difficulties and numerous practical failures in solving certain problems in operations research and systems analysis. The lack of continuous derivatives makes it very difficult to predict with a good degree of accuracy the effect of small changes in control variables--and this hinders the performance of many numerical algorithms.

These, then, are the main motivations for the study of non-differentiable functions--that is, functions for which derivatives do not exist in the traditional sense of the word.

To help information flow in this new and rapidly expanding field, a bibliography on nondifferentiable optimization has been prepared with the assistance of contributors from all parts of the world. It is hoped that this bibliography will be of use not only to mathematicians engaged in pure research in non-differentiable optimization but also to those interested in applying these techniques in other fields.

BIBLIOGRAPHY ON NONDIFFERENTIABLE OPTIMIZATION

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This is a research bibliography with all the advantages and shortcomings that this implies. The author has used it as a bibliographical data base when writing papers, and it is therefore largely a reflection of his own personal research interests. However, it is hoped that this bibliography will nevertheless be of use to others interested in nondifferentiable optimization.

1. MONOGRAPHS

This section contains monographs related to nondifferentiable optimization.

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2. ALGORITHMS

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3. GENERALIZED DIFFERENTIABILITY

This section contains papers on general notions of differentiability, optimality conditions in the nondifferentiable case, properties of perturbation functions in parametric programming and the stability of optimum programs in connec-

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