

Complementarity:
Applications, Algorithms and Extensions

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Complementarity: Applications, Algorithms and Extensions

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Preface

This volume presents state-of-the-art complementarity applications, algorithms, extensions and theory in the form of eighteen papers. These invited papers were presented at the International Conference on Complementarity 99 (ICCP99) held in Madison, Wisconsin during June 9-12, 1999 with support from the National Science Foundation under Grant DMS-9970102.

Complementarity is becoming more widely used in a variety of application areas. In this volume, there are papers studying the impact of complementarity in such diverse fields as deregulation of electricity markets, engineering mechanics, optimal control and asset pricing. Furthermore, application of complementarity and optimization ideas to related problems in the burgeoning fields of machine learning and data mining are also covered in a series of three articles.

In order to effectively process the complementarity problems that arise in such applications, various algorithmic, theoretical and computational extensions are covered in this volume. Nonsmooth analysis has an important role to play in this area as can be seen from articles using these tools to develop Newton and path following methods for constrained nonlinear systems and complementarity problems. Convergence issues are covered in the context of active set methods, global algorithms for pseudomonotone variational inequalities, successive convex relaxation and proximal point algorithms.

Theoretical contributions to the connectedness of solution sets and constraint qualifications in the growing area of mathematical programs with equilibrium constraints are also presented. A relaxation approach is given for solving such problems. Finally, computational issues related to preprocessing mixed complementarity problems are addressed.

The use of complementarity within other problem types, such as bilevel optimization and data mining is considered. Positive semidef-

infinite relaxations are a new and growing area of research that has significant ramifications for discrete optimization. These and other application specific extensions of the field are also covered in this volume.

It is hoped that the results presented here will inspire further contributions to the field of complementarity, especially in the form of novel applications and computational techniques with significant underlying theory.

MICHAEL FERRIS, OLVI MANGASARIAN AND JONG-SHI PANG