

Editors:

A. Dold, Heidelberg

B. Eckmann, Zürich

F. Takens, Groningen



George Isac

Complementarity Problems

Springer-Verlag

Berlin Heidelberg New York

London Paris Tokyo

Hong Kong Barcelona

Budapest

Autor

George Isac
Département de Mathématiques
Collège Militaire Royal
St. Jean
Québec, Canada J0J 1R0

Mathematics Subject Classification (1991): 49A99, 58E35, 52A40

ISBN 3-540-56251-6 Springer-Verlag Berlin Heidelberg New York
ISBN 0-387-56251-6 Springer-Verlag New York Berlin Heidelberg

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer-Verlag. Violations are liable for prosecution under the German Copyright Law.

© Springer-Verlag Berlin Heidelberg 1992
Printed in Germany

Typesetting: Camera ready by author
46/3140-543210 - Printed on acid-free paper

TABLE OF CONTENTS

Introduction	1
Chapter 1. PRELIMINARIES AND DEFINITIONS OF PRINCIPAL COMPLEMENTARITY PROBLEMS	4
Chapter 2. MODELS AND APPLICATIONS	16
2.1 Mathematical programming	16
2.2 Game theory	24
2.3 Variational inequalities and complementarity	28
2.4 Mechanics and complementarity	29
2.5 Maximizing oil production	38
2.6 Complementarity problems in economics	39
2.7 Equilibrium of traffic flows	48
2.8 The linear complementarity problem and circuit simulation	50
2.9 Complementarity and fixed point	50
Chapter 3. EQUIVALENCES	52
Chapter 4. EXISTENCE THEOREMS	70
4.1 Boundedness of the solution set	70
4.2 Feasibility and solvability	87
4.3 General existence theorems	116
Chapter 5. THE ORDER COMPLEMENTARITY PROBLEM	139
5.1 The linear order complementarity problem	140
5.2 The generalized order complementarity problem	146
Chapter 6. THE IMPLICIT COMPLEMENTARITY PROBLEM	162
6.1 The implicit complementarity problem and the fixed point theory	163
6.2 The implicit complementarity problem and a special variational inequality	169
6.3 The implicit complementarity problem and coincidence equations on convex cones	182

Chapter 7. ISOTONE PROJECTION CONES AND COMPLEMENTARITY	196
7.1 Isotone projection cones	196
7.2 Isotone projection cones and the complementarity problem	203
7.3 Mann's iterations and the complementarity problem	212
7.4 Projective metrics and the complementarity problem	214
 Chapter 8. TOPICS ON COMPLEMENTARITY PROBLEMS	 220
8.1 The basic theorem of complementarity	220
8.2 The multivalued order complementarity problem	226
8.3 Some classes of matrices and the linear complementarity problem	229
8.4 Some results about the cardinality of solution set	237
8.5 Alternative theorems and complementarity problems	244
8.6 Again on the implicit complementarity problem	249
8.7 Some new complementarity problems	256
8.8 Some special problems	260
 BIBLIOGRAPHY	 270
 SUBJECT INDEX	 295