

BOOK ANNOUNCEMENTS

M. GONDRAN et M. MINOUX, *Graphes et algorithmes*, Collection de la Direction des Etudes et Recherches d'Electricité de France (Editions Eyrolles, Paris 5e, 1979) 540 pp.

Avant-Propos. Notations. 1. *Généralités sur les graphes*. 1. Définitions et concepts de base, 2. Matrices associées à un graphe, 3. Connexité, 4. Cycles et cocycles, 5. Quelques graphes particuliers, 6. Les hypergraphes, Exercices, Bibliographie. 2. *Le problème du plus court chemin*. 1. Définitions et exemples, 2. Les algorithmes, 3. Le problème central de l'ordonnancement, Exercices, Bibliographie. 3. *Les algèbres de chemins*. 1. L'Algèbre de plus court chemin, 2. Définitions et propriétés, 3. Quelques exemples, 4. Algorithmes généraux, 5. Algèbres de chemins dans un graphe sans circuit, 6. Un dioïde particulier, 7. Les dioïdes à gauche et à droite, 8. Généralisation des algèbres de chemins, Exercices, Bibliographie. 4. *Arbres et arborescences*. 1. Arbres, Définitions et propriétés, 2. Le problème de l'arbre de poids minimum, 3. Arborescences, Exercices, Bibliographie. 5. *Flots et réseaux de transport*. 1. Définitions et propriétés, 2. Le problème du flot maximum dans un réseau de transport, 3. Le problème du flot compatible, théorème de compatibilité, 4. Flots à coût minimum, Exercices, Bibliographie. 6. *Flots avec multiplicateurs, Multiflots*. 1. Flots avec multiplicateurs, 2. Problèmes de multiples, Exercices, Bibliographie. 7. *Couplages et b-couplages*. 1. Problème du couplage maximum, 2. Algorithme de recherche d'un couplage maximum, 3. Couplages de poids maximum, 4. Un algorithme pour le problème du couplage de poids maximum, 5. *b-couplages, b-couplage maximum et b-couplage de poids maximum*, Exercices, Bibliographie. 8. *Parcours eulériens et hamiltoniens*. 1. Cycles et chaînes eulériens, 2. Le problème du "postier chinois" (non orienté), 3. Circuits et cycles hamiltoniens, Exercices, Bibliographie. 9. *Matroïdes*. 1. Définitions et résultats fondamentaux, 2. Dualité, 3. Le problème du sous-ensemble indépendant de poids maximum: l'algorithme glouton, 4. Intersections de matroïdes, 5. Matroïdes avec conditions de parité et généralisations, Exercices, Bibliographie. 10. *Les problèmes "non polynomiaux"*. 1. Equivalence entre problèmes, 2. Partition et recouvrement d'un hypergraphe, 3. Le problème du couplage d'un hypergraphe, 4. Coloration d'un graphe et d'un hypergraphe, 5. Le problème du sac à dos multidimensionnel, 6. Les problèmes de coûts fixes et les fonctions d'ensemble, 7. Les problèmes d'ordonnement, 8. Quelques autres problèmes concrets, 9. Les réductions entre problèmes, Exercices, Bibliographie. 11. *Les algorithmes d'énumération par séparation et évaluation*. 1. Un exemple d'exploration par séparation et évaluation, 2. Les procédures d'exploration par séparation et évaluation, 3. Deux exemples d'application, 4. Evaluation par défaut et pénalités, 5. ALICE, Exercices, Bibliographie. 12. *Les algorithmes approchés*. 1. Les algorithmes itératifs, 2. Les algorithmes gloutons, 3. Régularisation des coûts, 4. Optimalité des algorithmes approchés, Exercices, Bibliographie. Annexe 1. *Programmation linéaire*. 1. Définitions et résultats fondamentaux, 2. La résolution des programmes linéaires. L'algorithme primal du simplexe (forme révisée), 3. La notion de dualité, 4. Algorithmes dual et primal-dual, 5. Une application de la dualité: le théorème de Farkas et Minkowsky, Bibliographie. Annexe 2. *Programmation linéaire en nombres entiers*. 1. Polyèdres de sommets entiers, 2. Un algorithme de coupes, 3. La méthode des congruences décroissantes, Bibliographie. Annexe 3. *Relaxation lagrangienne de la résolution du problème dual*. 1. Définition du problème primal, 2. Définition du problème dual et propriétés, 3. Résolution du problème dual par une méthode de sous-gradient, 5. Génération de contraintes et résolution du problème restreint par une méthode de sous-gradient, Bibliographie. Annexe 4. *Programmation dynamique*. 1. Méthodes et exemples, 2. Améliorations de la programmation dynamique, Bibliographie. Index.

Alvin E. ROTH, *Axiomatic Models of Bargaining*, Lecture Notes in Economics and Mathematical Systems 170 (Managing Editors: M. Beckmann and H.P. Kunzi) (Springer-Verlag, Berlin, Heidelberg, New York, 1979) 121 pp.

Part I: Nash's Model of Bargaining. A. Introduction. B. The Formal Model and Axiomatic Derivation. Nash's Theorem. Individual Rationality. Symmetry and Asymmetry. C. Probabilistic Models. Bargaining as a NonCooperative Game. Bargaining as a Single Player Decision Problem. A Model of Negotiation. D. Risk Posture. Comparative Risk Aversion. Boldness and Fear of Ruin. Strategic Risk Posture and the Utility of Bargaining. *Part II: Other Models of Bargaining.* A. A Critical Evaluation of the Independence Properties. Independence of Equivalent Utility Representations. Independence of Irrelevant Alternatives. B. Ordinal Models of Bargaining. C. Interpersonal Models of Bargaining. Proportional Solutions. Ordinal Interpersonal Comparisons. D. "Irrelevant" Alternatives. An Individually Monotonic Solution. Dependence on the Ideal Point. *Appendix:* Summary of the Principal Properties and Results. *Bibliography.*

P.J. WEEDA, *Finite Generalized Markov Programming*, Mathematical Centre Tracts 92 (Mathematisch Centrum, Amsterdam, 1979) vii + 127 pp.

Acknowledgements. Introduction. I. Preliminaries. 1.1 Notation and some properties of matrices. 1.2 Substochastic matrices. 1.3 Markov renewal processes. 1.4 Finite Markov renewal decision models. *II. Finite Generalized Markov Programming Models.* 2.1 Introduction. 2.2 A finite generalized Markov programming model. 2.3 Policy iteration in the finite generalized Markov programming model. *III. On the Convergence of GMP-Schemes.* 3.1 Introduction. 3.2 A finite step convergence proof for distinctive and preserving GMP-schemes. *IV. Cutting Methods and Optimal Stopping.* 4.1 Introduction. 4.2 Optimal stopping and optimal cutting. 4.3 Some properties of GMP1. 4.4 Suboptimal cutting methods. 4.5 A third special version of a GMP-scheme. *V. A Numerical Comparison among Policy Iteration Methods.* 5.1 Introduction. 5.2 Some connections between the undiscounted MRD and GMP-models. 5.3 Numerical results for a class of randomly generated problems. 5.4 A production control problem. 5.5 Some conclusions. *VI. GMP-Models with Discounting.* 6.1 Introduction. 6.2 Some additional quantities in the finite GMP-model. 6.3 Policy iteration in the discounted GMP-model. 6.4 A partial Laurent expansion for the expected discounted reward vector in a parametric GMP-model. 6.5 Numerical example. *VII. Sensitive Optimality in the Parametric GMP-Model.* 7.1 Introduction. 7.2 Sensitive intervention time optimality. 7.3 On the computation of sensitive intervention time optimal policies. 7.4 On the computation of bias-optimal policies. *References.*

V.J. RAYWARD-SMITH, editor, *Combinatorial Optimization II*, Mathematical Programming Study 13 (Editor-in-chief: R.W. Cottle) (North-Holland, Amsterdam, 1980) viii + 142 pp.

Preface. CO79: Committee Members. (1) *Perfect triangle-free 2-matchings*, Gerard Cornuejols and William Pulleyblank. (2) *On the structure of all minimum cuts in a network and applications*, Jean-Claude Picard and Maurice Queyranne. (3) *Clutter percolation and random graphs*, Colin McDiamard. (4) *The use of recurrence relations in computing*, L.B. Wilson. (5) *A branch and bound algorithm for the Koopmans-Beckmann quadratic assignment problem*, C.S. Edwards. (6) *A problem of scheduling conference accommodations*, A.I. Hinxman. (7) *Constructing timetables for sport competitions*, J.A.M. Schreuder. (8) *The reconstruction of latin squares with applications to school timetabling and experimental design*, A.J.W. Hilton. (9) *An algorithm for the single machine sequencing problem with precedence constraints*, C.N. Potts. (10) *Finding k edge-disjoint spanning trees of minimum total weight in a network: an application of matroid theory*, Jens Clausen and Lone Aalekjaer Hansen. (11) *The distance between nodes for a class of recursive trees*, J.S. Clowes. (12) *Optimization problems arising from the incorporation of split values in search trees*, V.J. Rayward-Smith. (13) *Heuristic analysis, linear programming and branch and bound*, Laurence A. Wolsey. (14) *Heuristic improvement methods: How should starting solutions be chosen?* C.J. Pursglove and T.B. Boffey.

Magnus R. HESTENES, *Conjugate Direction Methods in Optimization*, Applications of Mathematics 12 (edited by A.V. Balakrishnan) (Springer-Verlag, New York, Heidelberg, Berlin 1980) x + 325 pp.

Chapter I. Newton's Method and the Gradient Method. 1. Introduction. 2. Fundamental Concepts. 3. Iterative Methods for Solving $g(x)=0$. 4. Convergence Theorems. 5. Minimization of Functions by Newton's Method. 6. Gradient Methods – The Quadratic Case. 7. General Descent Methods. 8. Iterative Methods for Solving Linear Equations. 9. Constrained Minima. *Chapter II. Conjugate Direction Methods.* 1. Introduction. 2. Quadratic Functions on \mathcal{E}^n . 3. Basic Properties of Quadratic Functions. 4. Minimization of a Quadratic Function F on k -Planes. 5. Method of Conjugate Directions (CD-Method). 6. Method of Conjugate Gradients (CG-Algorithm). 7. Gradient PARTAN. 8. CG-Algorithms for Nonquadratic Functions. 9. Numerical Examples. 10. Least Square Solutions. *Chapter III. Conjugate Gram-Schmidt Processes.* 1. Introduction. 2. A Conjugate Gram-Schmidt Process. 3. CGS-CG-Algorithms. 4. A Connection of CGS-Algorithms with Gaussian Elimination. 5. Method of Parallel Displacements. 6. Methods of Parallel Planes (PARP). 7. Modifications of Parallel Displacements Algorithms. 8. CGS-Algorithms for Nonquadratic Functions. 9. CGS-CG-Routines for Nonquadratic Functions. 10. Gauss-Seidel CGS-Routines. 11. The Case of Nonnegative Components. 12. General Linear Inequality Constraints. *Chapter IV. Conjugate Gradient Algorithms.* 1. Introduction. 2. Conjugate Gradient Algorithms. 3. The Normalized CG-Algorithm. 4. Termination. 5. Clustered Eigenvalues. 6. Nonnegative Hessians. 7. A Planar CG-Algorithm. 8. Justification of the Planar CG-Algorithm. 9. Modifications of the CG-Algorithm. 10. Two examples. 11. Connections between Generalized CG-Algorithms and Standard CG- and CD-Algorithms. 12. Least Square Solutions. 13. Variable Metric Algorithms. 14. A planar CG-Algorithm for Nonquadratic Functions. *References. Index.*

G. van der HOEK, *Reduction Methods in Nonlinear Programming*, Mathematical Centre Tracts 26 (Mathematisch Centrum, Amsterdam, 1980) v + 194 pp.

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Frank A. TILLMAN, Ching-Lai HWANG, Way KUO, *Optimization of Systems Reliability*, Industrial Engineering/4 (editor: Wilbur Meier, Jr.) (Marcel Dekker, New York and Basel, 1980) ix + 311 pp.

Preface. Chapter 1 Introduction. Chapter 2 Optimization Techniques for Systems Reliability with Redundancy: A Review. 2.1 Introduction. 2.2 Systems Models. 2.3 Statement of the Various Optimization Problems. 2.4 Optimization Techniques used to Determine the Optimal Systems Reliability. 2.5 Remarks on New Problems. 2.6 Optimization of Systems Reliability. *Chapter 3 Heuristic Methods Applied to Optimal Systems Reliability.* 3.1 Introduction. 3.2 A Heuristic Method: Sharma and Venkateswaran's Approach. 3.3 A Heuristic Method: Aggarwal's Approach. 3.4 A Heuristic Method: Misra's Approach. 3.5 A Heuristic Method: Ushakov's Approach. 3.6 A Heuristic Method: Nakagawa and Nakashima's Approach. *Chapter 4 Dynamic Programming applied to Optimal Systems Reliability.* 4.1 Introduction. 4.2 Basic Dynamic Programming Approach. 4.3 Dynamic Programming Approach Using Lagrange Multipliers. 4.4 Dynamic Programming Approach Using the Concept of Dominating Sequences. *Chapter 5 The Discrete Maximum Principle Applied to Optimal Systems Reliability.* 5.1 Introduction. 5.2 Statement of the Problem and the Computational Procedure. 5.3 Example. 5.4 Numerical Results. 5.5 Conclusion. *Chapter 6 Sequential Unconstrained Minimization Technique (SUMT) Applied to Optimal Systems Reliability.* 6.1 Introduction. 6.2 Formulation of the Problem. 6.3 Computational Procedures of SUMT. 6.4 Numerical Examples. *Chapter 7 Generalized Reduced Gradient Method (GRG) Applied to Optimal Systems Reliability.* 7.1 Introduction. 7.2 Numerical Examples. *Chapter 8 Method of Lagrange Multipliers and the Kuhn-Tucker Conditions in Optimal Systems Reliability.* 8.1 Introduction. 8.2 The Method of Lagrange Multipliers for a Single Constraint Problem. 8.3 The Kuhn-Tucker Conditions. 8.4 Method of Lagrange Multipliers and the Kuhn-Tucker Condition for the Two Linear Constraint Problem. 8.5 Conclusion. *Chapter 9 The Generalized Lagrangian Function Method Applied to Optimal Systems Reliability.* 9.1 Introduction. 9.2 The Generalized Lagrangian Function and its Computational Procedures. 9.3 Numerical Examples. *Chapter 10 Geometric Programming Applied to Optimal Systems Reliability.* 10.1 Introduction. 10.2 Formulation of the Problem. 10.3 A Numerical Example. *Chapter 11 Integer Programming Applied to Optimal Systems Reliability.* 11.1 Introduction. 11.2 The Partial Enumeration Method. 11.3 The Gomory Cutting Plane Method. 11.4 The Branch and Bound Method. 11.5 The Geoffrion Implicit Enumeration Method. *Chapter 12 Other Methods Applied to Systems Reliability Optimization Problems.* 12.1 Introduction. 12.2 A Classical Approach. 12.3 Parametric Method. 12.4 Linear Programming. 12.5 Separable Programming. *Chapter 13 Determination of Component Reliability and Redundancy for Optimum Systems Reliability.* 13.1 Introduction. 13.2 Statement of the Problem. 13.3 An Optimization Procedure. 13.4 Numerical Examples. 13.5 Concluding Remarks. *Appendix A1 Outline of Dynamic Programming. Appendix A2 Outline of the Discrete Maximum Principle. Appendix A3 Outline of the Generalized Reduced Gradient Method (GRG). Appendix A4 Outline of Geometric Programming. Index.*

Jacques ZAHND, *Traité d'Electricité, volume XI: Machines séquentielles* (Editions Georgi, St-Saphorin, Suisse, 1980) 265 pp.

Introduction. 1. *Préliminaires.* 1.1 Ensembles et fonctions, 1.2 Produits cartésiens, 1.3 Correspondance, 1.4 Séquences, 1.5 Graphes. 2. *Machines.* 2.1 Notions générales, 2.2 Machines composées, 2.3 Machines combinatoires, 2.4 Machines séquentielles, 2.5 Machines séquentielles complètement spécifiées, 2.6 Machines de Moore et de Mealy. 3. *Spécification des machines binaires.* 3.1 Expressions booléennes, 3.2 Equations de récurrence booléennes, 3.3 Graphes de récurrence booléens, 3.4 Graphes de récurrence réceptifs. 4. *Expressions régulières.* 4.1 Opérations régulières, 4.2 Diagrammes réguliers, 4.3 Automates finis, 4.4 Application à la synthèse des machines. 5. *Réduction des machines de Mealy.* 5.1 Simulation et réduction, 5.2 Machines quotients, 5.3 Classes

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