Discrete Applied Mathematics 3 (1981) 323–327
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BOOK ANNOUNCEMENTS

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

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 Monotic 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 Genealized 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.

I. Introduction and preliminary remarks. 1. Introduction and scope on the monograph. 2. Preliminary remarks. 2.1 The set of constraints. 2.2 Optimality conditions. *II. A computational comparison of self scaling variable metric algorithms.* 1. Introduction. 2.1 Self scaling variable metric algorithms. 2.2 Optimally conditioned self scaling algorithms. 2.3 Initial scaling of BFGS. 3. Computational experiments. 3.1 Algorithms implemented. 3.2 The choice of test problems, termination criteria and performance indicators. 3.3 Design of the experiments and results. 3.4 Discussion of the results. *III Recursive quadratic programming with self scaling updates of the second-order information.* 1. Introduction. 2. Convergence properties of recursive quadratic programming. 3. Algorithmic aspects of recursive quadratic programming. 3.1 Stepwise description of the algorithms. 3.2 Active set strategies. 3.3 Line search. 3.4 Updating of the inverse Hessian approximation. *IV. Asymptotic properties of reduction methods using linearly equality constrained reduced problems.* 1. Introduction. 2. Definition and solution of linearly constrained reduced problems. 3. Relations between the first order Kuhn–Tucker conditions of the original – and the reduced problems. 4. Convergence of sequences of Kuhn–Tucker points. 5. Active set strategies. 6. Convergence of the solutions of the reduced problems. 7. Coordinating phase I and phase II. 8. Convergence of the composit algorithm. *V. Algorithmic and numerical aspects of 2-phase reduction methods.* 1. Introduction. 2. Stepwise description of some 2-phase algorithms. 3. An adapted algorithm for linearly constrained nonlinear programming and the structure of the 2-phase algorithm. 4. Decomposition methods for matrices. 4.1 LU-decomposition following Peters and Wilkinson (1970). 4.2 Cholsesky-decomposition. 5. Updating of the Cholesky factors. 5.1 The rank 1 correction of B_k and H_k. 5.2 Updating of the Cholesky factors of B_k and H_k after a rank 1 correction. 5.3 Updatiang of the Cholesky factors of $N_k^T H_k N_k$. 5.3.1 A constraint is added to $I(z_k)$. 5.3.2 A constraint is deleted from $I(z_k)$. 5.3.3 A rank 1 correction is applied to H_k. *VI. A computational comparison of 2-phase algorithms and recursive quadratic programming algorithms.* 1. The design of computational experiments and the selection of testproblems. 2. Termination criteria. 3. Performance indicators. 4. Results and conclusions. *Appendix A* Constrained nonlinear test problems. *Appendix B* Unconstrained nonlinear test problems. *Appendix C* Special matrices. *Appendix D* Structure of the implementation of the 2-phase algorithms. *Appendix E* structure of the implementation of the recursive quadratic programming algorithm. *List of symbols. References. Author index. Subject index.*

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 Appkroach. 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 Langrangian Function Method Applied to Optimal Systems Reliability.* 9.1 Introduction. 9.2 The Generalized Langrangian 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 de compatibilité, 5.4 Construction des recouvrements, 5.5 Cas particuliers. 6. *Décomposition et assignement des machines séquentielles.* 6.1 Assignements, 6.2 Décomposition série, 6.3 Décomposition parallèle, 6.4 Partitions. Bibliographie. Index analytique.