OPTIMA

MATHEMATICAL PROGRAMMING SOCIETY NEWSLETTER

№ 36

March 1991

MPA Adds Associate Editors

Computational Papers Encouraged

COMPUTATION has always been a fundamental part of mathematical programming, and its importance is growing. The ready availability of a wide variety of powerful and relatively inexpensive computing environments means that the great majority of the algorithms that are now proposed can be implemented and evaluated and extended through computation. The mere fact, that problems that previously would have taken days or weeks to solve can now be solved in minutes or hours, means that we can try our methods while we think about them. This fact is leading increasingly to the emergence of computation as one of the specialties within mathematical programming. It is my intention as Editor-in-Chief of *Mathematical Programming* Series A to encourage this development. As a first step the number of issues to be published by *Mathematical Programming* Series A will be increased beginning in 1992 from nine to 12 per year.

The evaluation of computational papers is, of course, difficult and has typically been a process in which standards were applied that tended to discourage papers with primarily computational content. In spite of this fact (or because of it) I will not try to describe specific standards here. I doubt it is possible to give a useful description that is appropriate to all PAGE FOUR ►

OPTIMA

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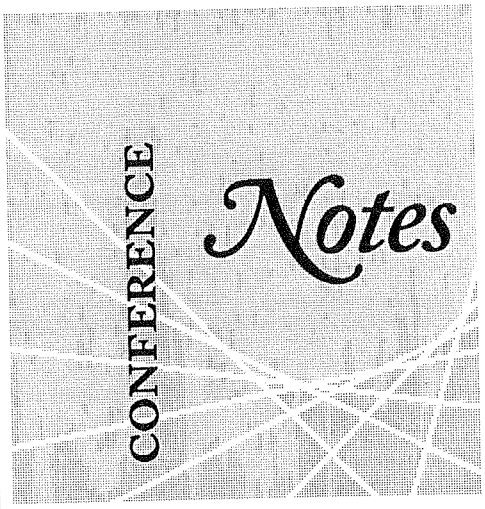


14TH SYMPOSIUM ON MATHEMATICAL PROGRAMMING WITH DATA PERTURBATIONS

The George Washington University
Washington, D.C.

May 21-22, 1992

A Fourteenth Symposium on Mathematical Programming with Data Perturbations will be held at George Washington University's Marvin Center on May 21-22, 1992. This symposium is designed to bring together practitioners who use mathematical programming optimization models and deal with questions of sensitivity analysis with researchers who are developing techniques applicable to these problems.

Contributed papers in mathematical programming are solicited in the following areas:

(1)Sensitivity and stability analysis results and their applications.

(2)Solution methods for problems involving implicitly defined problem functions.

(3)Solution methods for problems involving deterministic or stochastic parameter changes.

(4)Solution approximation techniques and error analysis.

"Clinical" presentations that describe problems in sensitivity or stability analysis encountered in applications are also invited.

Abstracts should provide a good technical summary of key results, avoid the use of mathematical symbols and references, not exceed 500 words, and include a title and the name and full mailing address of each author. Abstracts of papers intended for presentation at the Symposium should be sent in triplicate by March 9, 1992, to Professor Anthony V. Fiacco, Department of Operations Research, The George Washington University, Washington, DC 20052, Telephone (202) 994-7511.

Approximately 30 minutes will be allocated for the presentation of each paper. A blackboard and overhead projector will be available.

ANTHONY V. FIACCO

CO92

University of Oxford
England

July 6-9, 1992

This will be the latest in a series of Combinatorial Optimisation (CO) conferences held in the UK, the most recent being CO89 at Leeds University.

All aspects of combinatorial optimization are covered, including applications in Operational Research and Computer Science. A theme within the meeting will be "algorithms and probability." The invited speakers who have agreed to address the conference are:

P. Flajolet (France)

K. D. Glazebrook (UK)

R. M. Karp (USA)

N. Meggido (USA)

B. A. Reed (Germany).

Short Abstracts (at most 300 words) of contributed papers should be sent by April 1, 1992 to:

CO92, Department of Statistics
1 South Parks Road
Oxford OX1 3TG, England
e-mail: co92@uk.ac.ox.vax

Further information may be obtained from the same address.

COLIN MCDIARMID

IFORS 93

XIII World Conference on Operations Research
Lisboa, Portugal

July 12–16, 1992

The International Federation of Operations Research Societies (IFORS) will be 34 years old in 1993. As an association of 39 national OR societies and five kindred societies, its purpose is the development of operations research as a unified science and its advancement in all nations of the world. One of the main activities of IFORS is the organization of a World Conference every three years.

The IFORS XIII Conference will look to the future and highlight new and evolving methodological advances and areas of applications that will take OR into the next century. Invited and contributed sessions will address OR's important role in shaping the future business, industry, government, education and related scientific fields such as artificial intelligence, computer science, decision and information systems, and statistics. And recognizing that "What's past is prologue," the members of the international OR commmunity are invited and encouraged to present papers describing their current research and applications and state-of-the-art reviews.

Call-for-papers and paper submission forms are available from the Conference Secretariat. The abstract should reach the Conference Secretariat by April 1, 1992, for inclusion in the Invitation Program.

All over the world many colleagues are working under the direction of Prof. Saul Gass, Program Committee Chairman, to achieve a Conference with high scientific and technical standards. In Portugal, the Organizing Committee is also busy making arrangements to create the right environment for a fruitful meeting. Lisbon is a city full of tradition and character, and the social program will provide some pleasant surprises.

Program Committee Chairman:
Prof. Saul I. Gass
Management Science and Statistics
University of Maryland
College Park, MD 20742 U.S.A.
FAX (301) 314-9157

Organizing Committee Chairman:
Prof. J. Dias Coelho
Secretariat: Faculdade de Economia
Universidade Nova de Lisboa
Travessa Estevão Pinto
1000 Lisboa, Portugal
FAX 351-1-3871105

15TH MPS Symposium

University of Michigan

Ann Arbor, Mich.

August 15–19, 1994

The 15th Mathematical Programming Symposium will take place August 15-19, 1994, on the campus of the University of Michigan in Ann Arbor. The organizing committee is chaired by John Birge and includes Katta Murty, Romesh Saigal, James Bean, Robert L. Smith, Panos Papalmbros, and D. Teneketzis, all from the University of Michigan, Richard Caron, from the University of Windsor, Irwin Schochetmann from Oakland University, Jeffrey Alden from General Motors, and Marilyn Maddox from Ford Motor Co.

Although it is small (130,000 population), Ann Arbor has many conveniences of a big city, including a wide variety of cultural activities. The city is also just 30 minutes from the Detroit Metropolitan Airport, which provides nonstop service to London, Frankfort, Amsterdam, Paris, Seoul, Tokyo, and most of North America. Great Lakes beaches and parks are within a day's drive, while driving time from Chicago or Toronto is five to six hours.

The organizing committee has begun the process of securing meeting rooms, accommodations, and developing the program. They plan to build on Michigan's location in the manufacturing center of the United States by actively involving local industry and highlighting mathematical programming's uses in improving quality and efficiency.

JOHN BIRGE

CALL FOR PAPERS

3RD STOCKHOLM OPTIMIZATION DAYS

Stockholm, Sweden

June 25-26, 1992

We invite theoretical, computational and applied papers for the 3rd Stockholm Optimization Days.

The conference will take place at KTH (the Royal Institute of Technology) in Stockholm, June 25-26, 1992, the week before the Helsinki TIMS/EURO Conference. (Stockholm is a nice 12-hour cruise from Helsinki.)

We plan to have sessions on dual optimization methods, spare parts optimization techniques, power planning and large scale nonlinear programming, among other areas.

Invited speakers include:

Dimitri Bertsekas
Jacques Desrosiers
Marshall Fisher
Philip Gill
Stephen Graves
Don Hearn
Jim Ho
Walter Murray
Craig Sherbrooke
Philippe Toint

There will be limited support available for local expenses.

Abstracts should be sent by May 1 (preferably by e-mail) to P. O. Lindberg at pol@math.kth.se (on internet) or pol@sekth.bitnet (on bitnet), or Department of Mathematics, KTH, 100 44 Stockholm, Sweden.

CALL FOR PAPERS

Computational Optimization and Applications

A new journal entitled ***Computational Optimization and Applications*** is being established by Kluwer Academic Publications, with the first issue appearing in 1992. This peer reviewed journal is committed to timely publication of research and tutorial papers on the analysis and development of computational algorithms and modeling technology for optimization. Algorithms either for general classes of optimization problems or for more specific applied problems are of interest. Stochastic algorithms as well as deterministic algorithms will be considered. Papers that can provide theoretical analysis along with carefully designed computational experiments are particularly welcome. Author instructions and a list of the editorial board can be obtained from either of the following addresses:

hager@math.ufl.edu
William W. Hager
Department of Mathematics
201 Walker Hall
University of Florida
Gainesville, FL 32611

Karen@world.std.com
Karen S. Cullen
Kluwer Academic Publishers
Editorial Office
101 Philip Drive
Norwell, MA 02061

Technical Reports
Working Papers

Mathematical Sciences
Clemson University
Clemson, SC 29634-1907

H-W. Jung, R.E. Marsten and M.J. Saltzman, *"The Column Cholesky Method for Numerical Factorization in Interior Point Algorithms,"* No. 596.

H-W. Jung and M.J. Saltzman, *"The Multifrontal Method for Numerical Factorization in Interior Point Algorithms,"* No. 597.

M.M. Kostreva and M.M. Wiecek, *"Time Dependency in Multiple Objective Dynamic Programming,"* No. 601.

J.V. Brawley and G.L. Mullen, *"Scalar Polynomial Functions on the Nonsingular n x n Matrices Over a Finite Field,"* No. 602.

S.G. Hedetniemi and R. Laskar, *"The Fifth Clemson mini-Conference ON[R] Discrete Mathematics,"* No. 603.

M. Wiecek, *"POLYSKEL - Decision Support for a Class of Multicriteria Problems,"* No. 604.

P.B. Mirchandani and M. Wiecek, *"Routing with Nonlinear Multiattribute Cost Functions,"* No. 606.

R.E. Bixby and M.J. Saltzman, *"Recovering an Optimal LP Basis from an Interior Point Solution,"* No. 607.

A.A. Ebiefung and M.M. Kostreva, *"Z-matrices and the Generalized Linear Complementarity Problem,"* No. 608.

A.A. Ebiefung and M.M. Kostreva, *"The Generalized Leontief Input-Output Model and its Application to the Choice of New Technology,"* No. 609.

A.A. Ebiefung and M.M. Kostreva, *"Generalized P_0 and Z-Matrices,"* No. 610.

J.V. Brawley, *"Polynomial Functions on Matrices over a Finite Field,"* No. 611.

Systems Optimization Laboratory
Department of Operations Research
Stanford University
Stanford, CA 94305-4022

F. Jarre and M.A. Saunders, *"An Adaptive Primal-Dual Method for Linear Programming,"* SOL 91-1.

D.B. Ponceleón, *"Barrier Methods for Large-Scale Quadratic Programming,"* SOL 91-2.

P.E. Gill, W. Murray, D.B. Ponceleón and M.A. Saunders, *"Primal-Dual Methods for Linear Programming,"* SOL 91-3.

G.B. Dantzig and G. Infanger, *"Large-Scale Stochastic Linear Programs: Importance Sampling and Benders Decomposition,"* SOL 91-4.

G.B. Dantzig, *"Converting a Converging Algorithm into a Polynomially Bounded Algorithm,"* SOL 91-5.

G. Infanger, *"Monte Carlo (Importance) Sampling Within a Benders Decomposition Algorithm for Stochastic Linear Programs Extended Version: Including Results of Large-Scale Problems,"* SOL-6.

P.E. Gill, W. Murray, D.B. Ponceleón and M.A. Saunders, *"Solving Reduced KKT Systems in Barrier Methods for Linear and Quadratic Programming,"* SOL 91-7.

F. Jarre, *"An Interior-Point Method for Minimizing the Maximum Eigenvalue of a Linear Combination of Matrices,"* SOL 91-8.

F. Jarre and M.A. Saunders, *"Practical Aspects of an Interior-Point Method for Convex Programming,"* SOL 91-9.

G.B. Dantzig, J.K. Ho and G. Infanger, *"Solving Stochastic Linear Programs on a Hypercube Multicomputer,"* SOL 91-10.

G.B. Dantzig and G. Infanger, *"Multi-Stage Stochastic Linear Programs for Portfolio Optimization,"* SOL 91-11.

BIXBY: MPA EDITORS

FROM PAGE ONE

areas of mathematical programming, although some guidance is provided by the references listed below. Rather, it is important that the editorial board include people who have done significant computation and can make these judgements. With this idea in mind, the editorial board of *Mathematical Programming* Series A has been expanded to include three new associate editors, appointed specifically (though not exclusively) to deal with computational work:

I.J. Lustig, Princeton University, Princeton, New Jersey, USA

M. Jünger, University of Cologne, Cologne, Germany

R. Meyer, University of Wisconsin, Madison, Wisconsin, USA.

Submissions of papers will continue, as before, through the four co-editors: R.E. Bixby, M. Kojima, R. Schnabel and L. Wolsey. Computational papers in the area of discrete optimization can be sent to either Bixby or Wolsey. Computationally oriented work on linear programming should be sent to Bixby, and computational work on nonlinear programming should be sent to R. Schnabel.

R.E. BIXBY, EDITOR-IN-CHIEF
Mathematical Programming, Series A

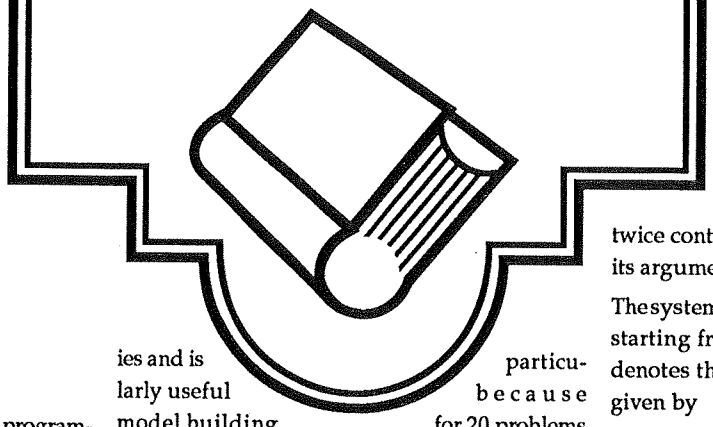
References on the publication of computational papers:

H.P. Crowder, R.S. Dembo and J.M. Mulvey, "On Reporting Computational Experiments with Mathematical Software," ***ACM Transactions on Mathematical Software*** **5 (1979), 193-203.**

H.J. Greenberg, "Computational Testing: Why, How and How Much," ***ORSA Journal on Computing*** **2:1 (1990), 94-97.**

R.H.F. Jackson, P.T. Boggs, S.G. Nash, and S. Powell, "Guidelines for Reporting Results of Computational Experiments: Report of the Ad Hoc Committee," ***Mathematical Programming*** **49, (1991) 413-425.**

BOOK REVIEWS



Model Building in Mathematical Programming

THIRD EDITION

By H.P. Williams

John Wiley, 1990

ISBN 0-471-92581-0

When attempting to apply mathematical programming techniques to solve problems arising in practice, the first step to be undertaken is to formulate an appropriate model. Whereas there are many books dealing with mathematical programming algorithms, there are only a few which address the problem of model building. And even if they address this issue, they do not discuss it in enough depth. This gap is filled by the present book which is concerned entirely with the development of suitable models for practical applications.

The scope of the book is best visualized by repeating its aims as stated in the preface.

a) "It is intended to provide students in universities and polytechnics with a solid foundation in the principles of model building as well as the more mathematical, algorithmic side of the subject which is conventionally taught."

b) "This book is also intended to provide managers with a fairly non-technical appreciation of the scope and limitations of mathematical programming."

c) "It is hoped that the general reader will be able to use the principles described in this book to build mathematical models and therefore learn about the functioning of systems which purely verbal descriptions fail to explain."

The book meets these three main goals. As indicated in the preface, the reader cannot expect that mathematical programming theory and algorithms are covered in depth, but in view of many publications in this area, it was not the intention of the author. The book concentrates on case studies and is particularly useful because model building for 20 problems is discussed in detail and is accompanied by explicit solutions. It will be appreciated very much by practitioners who already have knowledge in the field of mathematical programming.

For a fourth edition I would like to have more up-to-date references included and, in addition to linear and integer programming, I would recommend that dynamic programming be discussed as well.

G. REINELT

Numerical Solution of Optimal Control Problems with State Constraints by Sequential Quadratic Programming in Function Spaces

By K.C.P. Machielsen

CWI Tract 53

Centrum voor Wiskunde en Informatica

Amsterdam, The Netherlands, 1988

In this monograph completely determined optimal control problems are considered. It is assumed that they are described by a system of ordinary differential equations of the form

$\dot{x}(t) = f(x(t),u(t),z) \quad 0 \le t \le T$

where the state in $x:[0,T] \to R^n$ and the control variable is $u: [0,T] \to R^m$, and $f: R^n \times R^m \times [0,T] \to R^n$ is assumed to be twice continuously differentiable with respect to its arguments.

The system is to be controlled over the period [0,T] starting from the initial state $x_0 = x(0)$, where T denotes the final time. The objective function is given by

$J(x,u): = \int_0^T f_0(x(t),u(t),z)dt + g_0(x(T),T),$

where f_0 and g_0 are assumed to be twice continuously differentiable.

The purpose of this monograph is to present numerical methods for solving the state constraint optimal control problem. This is done by the sequential programming methods in function spaces.

In the monograph this technique is discussed within the frame of nonlinear differentiable optimization problems. In this general setting the well-known maximum principle is derived from the necessary optimality conditions. Then the sequential programming method in Banach Spaces is discussed as an iterative decent method where the direction of search is determined by the solution of a subproblem with quadratic objective and linear constraint.

For state constrained optimal control problems this method cannot be applied immediately. Thus a modification of the subproblem is proposed which only leads to approximate solutions.

The numerical implementation of the method comes down to the numerical solution of a linear multipoint boundary value problem. At the end of this monograph numerical solutions for the unstationary dolphin flight of a glider, for the reentry maneuver of an Apollo capsule, and for the optimal control of servo systems along a prespecified path are given.

The material in this monograph is nicely presented. Of special interest are the numerical examples given at the end.

D. PALLASCHKE

OPTIMA Journals

Vol. 53, No. 1

J. Renegar and M. Shub, *"Unified Complexity Analysis for Newton LP Methods."*

T.F. Coleman and P.A. Fenyes, *"Partitioned Quasi-Newton Methods for Nonlinear Equality Constrained Optimization."*

D. Burton and Ph.L. Toint, *"On An Instance of the Inverse Shortest Paths Problem."*

F. Rendl and H. Wolkowicz, *"Applications of Parametric Programming and Eigenvalue Maximization to the Quadratic Assignment Problem."*

H.E. Romeijn, R.L. Smith and J.C. Bean, *"Duality in Infinite Dimensional Linear Programming."*

M. Fukushima, *"Equivalent Differentiable Optimization Problems and Descent Methods for Asymmetric Variational Inequality Problems."*

V.H. Nguyen and J-J. Strodiot, *"Computing a Global Optimal Solution to a Design Centering Problem."*

Vol. 53, No. 2

J.M. Steele, *"Euclidean Semi-Matchings of Random Samples."*

J. Fonlupt and D. Naddef, *"The Traveling Salesman Problem in Graphs with Some Excluded Minors."*

M. Fischetti and P. Toth, *"An Additive Bounding Procedure for the Assymmetric Traveling Salesman Problem."*

J.A.M. Potters, I.J. Curiel and S.H. Tijs, *"Traveling Salesman Games."*

R. Fourer, *"A Simplex Algorithm for Piecewise-Linear Programming III: Computational Analysis and Applications."*

S.R. Mohan and R. Sridhar, *"A Note on a Characterization of P-Matrices."*

Vol. 53, No. 3

R.K. Ajuja, A.V. Goldberg, J.B. Orlin and R.E. Tarjan, *"Finding Minimum-Cost Flows by Double Scaling."*

C. Zălinescu, *"A Note on d-Stability of Convex Programs and Limiting Lagrangians."*

B. Rustem, *"A Constrained Min-Max Algorithm for Rival Models of the Same Economic System."*

P. Tseng, *"Complexity Analysis of a Linear Complementarity Algorithm Based on a Lyapunov Function."*

B.C. Eaves and U. Rothblum, *"Dines-Fourier-Motzkin Quantifier Elimination and an Application of Corresponding Transfer Principles over Ordered Fields."*

Z.B. Zabinsky and R.L. Smith, *"Pure Adaptive Search in Global Optimization."*

P.T. Thach, *"A Decomposition Method Using a Pricing Mechanism for Min Concave Cost Flow Problems with a Hierarchical Structure."*

T. Naitoh and S. Fujishige, *"A Note on the Frank-Tardos Bi-Truncation Algorithm for Crossing-Submodular Functions."*

Vol. 54, No. 1

R.G. Bland and D.L. Jensen, *"On the Computational Behavior of a Polynomial-Time Network Flow Algorithm."*

J.B. Orlin and R.K. Ahuja, *"New Scaling Algorithms for the Assignment and Minimum Mean Cycle Problems."*

U.G. Rothblum, *"Characterization of Stable Matchings as Extreme Points of a Polytope."*

E.R. Barnes, A.J. Hoffman and U.G. Rothblum, *"Optimal Partitions Having Disjoint Convex and Conic Hulls."*

H.C. Lai and S.Y. Wu, *"Extremal Points and Optimal Solutions for General Capacity Problems."*

A. Billionnet and A. Sutter, *"Persistency in Quadratic 0-1 Optimization."*

Vol. 54, No. 2

S.A. Vavasis, *"Local Minima for Indefinite Quadratic Knapsack Problems."*

E. Polak, J.E. Higgins and D.Q. Mayne, *"A Barrier Function Method for Minimax Problems."*

R. Polyak, *"Modified Barrier Functions (Theory and Methods)."*

R.H. Mladineo, *"Convergence Rates of a Global Optimization Algorithm."*

R.J. Caron, M. Hlynka and J.F. McDonald, *"On the Best Case Performance of Hit and Run Methods for Detecting Necessary Constraints."*

Vol. 54, No. 3

K.M. Anstreicher and R.A. Bosch, *"Long Steps in a $O(n^3L)$ Algorithm for Linear Programming."*

M. Kojima, N. Megiddo and Y. Ye, *"An Interior Point Potential Reduction Algorithm for the Linear Complementarity Problem."*

K.M. Anstreicher, J. Lee and T.F. Rutherford, *"Crashing a Maximum-Weight Complementary Basis."*

C. Roos and J.-Ph. Vial, *"A Polynomial Method of Approximate Centers for Linear Programming."*

R.L. Smith and I.E. Schochet-Man, *"Finite Dimensional Approximation in Infinite Dimensional Mathematical Programming."*

D.M. Topkis, *"Paths on Polymatroids."*

J.P. Sousa and L.A. Wolsey, *"A Time Indexed Formulation on Non-Preemptive Single-Machine Scheduling Problems."*

Postdoctoral Research Position in Optimization at Cornell University

The Cornell Computational Optimization Project (CCOP) has an opening for a postdoctoral research position, beginning Fall '92. This is a 1-year position with possible extension to two years.

CCOP spans two departments at Cornell (CS and OR) and is concerned with all aspects of optimization, continuous and discrete. Currently we are comprised of several faculty, research associates, and postdoctoral researchers (and Ph.D. students) covering many facets of computational and theoretical optimization. Computing resources include a large network of Sun workstations and access to several parallel computers in the Cornell Theory Center.

If you will have received a Ph.D. in an optimization-related area by Fall '92 and are interested, please send your application, with a vita listing three references, to:

Professor M.J. Todd
CCOP, School of OR&IE
229 ETC Bldg.
Cornell University
Ithaca, NY 14853-3801.

Inquiries can be sent via email to:
miketodd@orie.cornell.edu
or coleman@cs.cornell.edu.

Application for Membership

Mail to:

THE MATHEMATICAL PROGRAMMING SOCIETY, INC.
c/o International Statistical Institute
428 Prinses Beatrixlaan
2270 AZ Voorburg
The Netherlands

Cheques or money orders should be made payable to
THE MATHEMATICAL PROGRAMMING SOCIETY, INC.
in one of the currencies listed below.

Dues for 1992, including subscription to the journal ***Mathematical Programming***, are Dfl.115.00 (or $55.00 or DM100.00 or £32.50 or FF345.00 or Sw.Fr.86.00).

Student applications: Dues are one-half the above rates. Have a faculty member verify your student status and send application with dues to above address.

I wish to enroll as a member of the Society. My subscription is for my personal use and not for the benefit of any library or institution. I enclose payment as follows:

Dues for 1992 _____

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Faculty verifying status _____

Institution _____

Gallimaufry

ANNA NAGURNEY (Univ. of Massachusetts) is the recipient of an NSF Faculty Award for Women. These five-year awards are designed to recognize and support women academic leaders involved in both teaching and research. ¶**BOB BIXBY** (Rice) is visiting Konrad-Zuse-Zentrum for Information Technology Berlin until October, 1992. ¶**LES TROTTER** (Cornell) is visiting E.P.F.L., Lausanne, during academic year 1991-92. ¶**JOHN R. BIRGE** (Univ. of Michigan) visited the University of Florida in February, giving three special seminars on stochastic programming. ¶Deadline for the next OPTIMA is June 15, 1992.

Books for review should be sent to the Book Review Editor,
Professor Adolphus J.J. Talman
Department of Econometrics
Tilburg University
P.O. Box 90153
5000 LE Tilburg
Netherlands

Journal contents are subject to change by the publisher.

Donald W. Hearn, EDITOR
A.J.J. Talman, ASSOCIATE EDITOR
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Elsa Drake, DESIGNER

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