



Michael Saunders

Professor (Research) of Management Science and Engineering, Emeritus

 Curriculum Vitae available Online

Bio

BIO

Saunders develops mathematical methods for solving large-scale constrained optimization problems and large systems of equations. He also implements such methods as general-purpose software to allow their use in many areas of engineering, science, and business. He is co-developer of the large-scale optimizers MINOS, SNOPT, SQOPT, PDCO, the dense QP and NLP solvers LSSOL, QPOPT, NPSOL, and the linear equation solvers SYMMLQ, MINRES, MINRES-QLP, LSQR, LSMR, LSLQ, LNLQ, LSRN, LUSOL.

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Management Science and Engineering
- Member, Institute for Computational and Mathematical Engineering (ICME)

HONORS AND AWARDS

- Orchard-Hays Prize, MPS (1985)
- Highly Cited Researcher, Computer Science, ISI (2004)
- Highly Cited Researcher, Mathematics, ISI (2007)
- Honorary Fellow, RSNZ (2007)
- Linear Algebra Prize, SIAM (2012)
- Invention Hall of Fame, OTL, Stanford University (2012)
- Fellow, SIAM (2013)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Associate Editor, NACO (2010 - 2016)
- Member, ACM (1982 - present)
- Member, INFORMS (2010 - present)
- Member, ORSNZ (1990 - present)
- Member, SIAM (1980 - present)
- Associate Editor, ACM TOMS (1982 - 2004)
- Associate Editor, SIAM Journal on Optimization (1989 - 2002)
- Associate Editor, OPTE (1999 - present)

PROFESSIONAL EDUCATION

- B.Sc. (Hons), Canterbury , Mathematics (1965)
- MS, Stanford University , Computer Science (1970)
- PhD, Stanford University , Computer Science (1972)

LINKS

- My homepage: <http://stanford.edu/~saunders/>
- My lab site: <http://stanford.edu/group/SOL>
- Where my office and students are (most of them): <http://icme.stanford.edu/>
- Homepage for our DOE and NIH grants: <http://stanford.edu/group/SOL/multiscale/>

Teaching

COURSES

2025-26

- Linear Algebra and Optimization Seminar: CME 510 (Win)

2024-25

- Linear Algebra and Optimization Seminar: CME 510 (Win)

Publications

PUBLICATIONS

- **IMPLEMENTING A SMOOTH EXACT PENALTY FUNCTION FOR EQUALITY-CONSTRAINED NONLINEAR OPTIMIZATION** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*
Estrin, R., Friedlander, M. P., Orban, D., Saunders, M. A.
2020; 42 (3): A1809–A1835
- **IMPLEMENTING A SMOOTH EXACT PENALTY FUNCTION FOR GENERAL CONSTRAINED NONLINEAR OPTIMIZATION** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*
Estrin, R., Friedlander, M. P., Orban, D., Saunders, M. A.
2020; 42 (3): A1836–A1859
- **Analysis of the Regularization Parameters of Primal-Dual Interior Method for Convex Objectives Applied to H-1 Low Field Nuclear Magnetic Resonance Data Processing (vol 49, pg 1129, 2018)** *APPLIED MAGNETIC RESONANCE*
Campisi-Pinto, S., Levi, O., Benson, D., Cohen, M., Resende, M., Saunders, M., Linder, C., Wiesman, Z.
2019; 50 (1-3): 521
- **EUCLIDEAN-NORM ERROR BOUNDS FOR SYMMLQ AND CG** *SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS*
Estrin, R., Orban, D., Saunders, M.
2019; 40 (1): 235–53
- **LSLQ: AN ITERATIVE METHOD FOR LINEAR LEAST-SQUARES WITH AN ERROR MINIMIZATION PROPERTY** *SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS*
Estrin, R., Orban, D., Saunders, M. A.
2019; 40 (1): 254–75
- **Stabilized Optimization Via an NCL Algorithm**
Ma, D., Judd, K. L., Orban, D., Saunders, M. A.
edited by AlBaali, M., Grandinetti, L., Purnama, A.
SPRINGER.2018: 173–91
- **Reliable and efficient solution of genome-scale models of Metabolism and macromolecular Expression** *SCIENTIFIC REPORTS*

- Ma, D., Yang, L., Fleming, R. M., Thiele, I., Palsson, B. O., Saunders, M. A.
2017; 7
- **Conditions for duality between fluxes and concentrations in biochemical networks** *JOURNAL OF THEORETICAL BIOLOGY*
Fleming, R. M., Vlassis, N., Thiele, I., Saunders, M. A.
2016; 409: 1-10
 - **Novel 1H low field nuclear magnetic resonance applications for the field of biodiesel** *Biotechnology for Biofuels*
Berman, P., Leshem, A., Etziony, O., Levi, O., Parmet, Y., Saunders, M., Wiesman, Z.
2013; 6:55: 20
 - **LSRN: a parallel iterative solver for strongly over- or under-determined systems** *SIAM J. Sci. Comp.*
Meng, X., Saunders, M. A., Mahoney, M. W.
2013; 36 (2): C95-C118
 - **Laplace inversion of low-resolution NMR relaxometry data using sparse representation methods** *Concepts in Magnetic Resonance Part A*
Berman, P., Levi, O., Parmet, Y., Saunders, M., Wiesman, Z.
2013; 42A:3: 72-88
 - **A variational principle for computing nonequilibrium fluxes and potentials in genome-scale biochemical networks** *JOURNAL OF THEORETICAL BIOLOGY*
Fleming, R. M., MAES, C. M., Saunders, M. A., Ye, Y., Palsson, B. O.
2012; 292: 71-77
 - **LSMR: AN ITERATIVE ALGORITHM FOR SPARSE LEAST-SQUARES PROBLEMS** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*
Fong, D. C., Saunders, M.
2011; 33 (5): 2950-2971
 - **SNOPT: An SQP algorithm for large-scale constrained optimization, SIGEST article** *SIAM Rev.*
Gill, P. E., Murray, W., Saunders, M., A.
2005; 1 (47): 99-131
 - **Atomic decomposition by basis pursuit, SIGEST article** *SIAM Rev.*
Chen, S., S., Donoho, D., L., Saunders, M., A.
2001; 1 (43): 129-159
 - **Properties of semi-conjugate gradient methods for solving unsymmetric positive definite linear systems** *OPTIMIZATION METHODS & SOFTWARE*
Huang, N., Dai, Y., Orban, D., Saunders, M. A.
2023
 - **HyKKT: a hybrid direct-iterative method for solving KKT linear systems** *OPTIMIZATION METHODS & SOFTWARE*
Regev, S., Chiang, N., Darve, E., Petra, C. G., Saunders, M. A., Swirydowicz, K., Peles, S.
2022
 - **Linear solvers for power grid optimization problems: A review of GPU-accelerated linear solvers** *PARALLEL COMPUTING*
Swirydowicz, K., Darve, E., Jones, W., Maack, J., Regev, S., Saunders, M. A., Thomas, S. J., Peles, S.
2022; 111
 - **LARGE-SCALE OPTIMIZATION WITH LINEAR EQUALITY CONSTRAINTS USING REDUCED COMPACT REPRESENTATION** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*
Brust, J. J., Marcia, R. F., Petra, C. G., Saunders, M. A.
2022; 44 (1): A103-A127
 - **Linear systems arising in interior methods for convex optimization: a symmetric formulation with bounded condition number** *OPTIMIZATION METHODS & SOFTWARE*
Ghannad, A., Orban, D., Saunders, M. A.
2021
 - **Simulation-Based Sensitivity Analysis of Regularization Parameters for Robust Reconstruction of Complex Material's T-1 - (T2H)-H-1 LF-NMR Energy Relaxation Signals** *APPLIED MAGNETIC RESONANCE*

- Campisi-Pinto, S., Levi, O., Benson, D., Resende, M., Saunders, M., Linder, C., Wiesman, Z.
2019
- **Creation and analysis of biochemical constraint-based models using the COBRA Toolbox v.3.0.** *Nature protocols*
Heirendt, L., Arreckx, S., Pfau, T., Mendoza, S. N., Richelle, A., Heinken, A., Haraldsdottir, H. S., Wachowiak, J., Keating, S. M., Vlasov, V., Magnusdottir, S., Ng, C. Y., Preciat, et al
2019
 - **DynamicME: dynamic simulation and refinement of integrated models of metabolism and protein expression.** *BMC systems biology*
Yang, L., Ebrahim, A., Lloyd, C. J., Saunders, M. A., Palsson, B. O.
2019; 13 (1): 2
 - **Estimating Cellular Goals from High-Dimensional Biological Data**
Yang, L., Saunders, M. A., Lachance, J., Palsson, B. O., Bento, J., Assoc Comp Machinery
ASSOC COMPUTING MACHINERY.2019: 2202–11
 - **LNLQ: AN ITERATIVE METHOD FOR LEAST-NORM PROBLEMS WITH AN ERROR MINIMIZATION PROPERTY** *SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS*
Estrin, R., Orban, D., Saunders, M. A.
2019; 40 (3): 1102–24
 - **Analysis of the Regularization Parameters of Primal-Dual Interior Method for Convex Objectives Applied to H-1 Low Field Nuclear Magnetic Resonance Data Processing** *APPLIED MAGNETIC RESONANCE*
Campisi-Pinto, S., Levi, O., Benson, D., Cohen, M., Resende, M., Saunders, M., Linder, C., Wiesman, Z.
2018; 49 (10): 1129–50
 - **Principles of proteome allocation are revealed using proteomic data and genome-scale models** *SCIENTIFIC REPORTS*
Yang, L., Yurkovich, J. T., Lloyd, C. J., Ebrahim, A., Saunders, M. A., Palsson, B. O.
2016; 6
 - **solveME: fast and reliable solution of nonlinear ME models.** *BMC bioinformatics*
Yang, L., Ma, D., Ebrahim, A., Lloyd, C. J., Saunders, M. A., Palsson, B. O.
2016; 17 (1): 391
 - **Heart rate analysis by sparse representation for acute pain detection** *MEDICAL & BIOLOGICAL ENGINEERING & COMPUTING*
Tejman-Yarden, S., Levi, O., Beizerov, A., Parment, Y., Tu Nguyen, T., Saunders, M., Rudich, Z., Perry, J. C., Baker, D. G., Moeller-Bertram, T.
2016; 54 (4): 595-606
 - **Heart rate analysis by sparse representation for acute pain detection.** *Medical & biological engineering & computing*
Tejman-Yarden, S., Levi, O., Beizerov, A., Parment, Y., Nguyen, T., Saunders, M., Rudich, Z., Perry, J. C., Baker, D. G., Moeller-Bertram, T.
2016; 54 (4): 595-606
 - **A Practical Factorization of a Schur Complement for PDE-Constrained Distributed Optimal Control** *JOURNAL OF SCIENTIFIC COMPUTING*
Choi, Y., Farhat, C., Murray, W., Saunders, M.
2015; 65 (2): 576-597
 - **Do genome-scale models need exact solvers or clearer standards?** *MOLECULAR SYSTEMS BIOLOGY*
Ebrahim, A., Almaas, E., Bauer, E., Bordbar, A., Burgard, A. P., Chang, R. L., Draeger, A., Famili, I., Feist, A. M., Fleming, R. M. T., Fong, S. S., Hatzimanikatis, V., Herrgard, et al
2015; 11 (10): 831
 - **Systems biology definition of the core proteome of metabolism and expression is consistent with high-throughput data.** *Proceedings of the National Academy of Sciences of the United States of America*
Yang, L., Tan, J., O'Brien, E. J., Monk, J. M., Kim, D., Li, H. J., Charusanti, P., Ebrahim, A., Lloyd, C. J., Yurkovich, J. T., Du, B., Dräger, A., Thomas, et al
2015; 112 (34): 10810-10815
 - **Study of liquid-phase molecular packing interactions and morphology of fatty acid methyl esters (biodiesel).** *Biotechnology for biofuels*
Berman, P., Meiri, N., Colnago, L. A., Moraes, T. B., Linder, C., Levi, O., Parment, Y., Saunders, M., Wiesman, Z.
2015; 8: 12-?

- **LSRN: A PARALLEL ITERATIVE SOLVER FOR STRONGLY OVER- OR UNDERDETERMINED SYSTEMS.** *SIAM journal on scientific computing* : a publication of the Society for Industrial and Applied Mathematics
Meng, X., Saunders, M. A., Mahoney, M. W.
2014; 36 (2): C95-C118
- **Algorithm 937: MINRES-QLP for Symmetric and Hermitian Linear Equations and Least-Squares Problems** *ACM TRANSACTIONS ON MATHEMATICAL SOFTWARE*
Choi, S. T., Saunders, M. A.
2014; 40 (2)
- **Algorithm 937: MINRES-QLP for Symmetric and Hermitian Linear Equations and Least-Squares Problems.** *ACM transactions on mathematical software. Association for Computing Machinery*
Choi, S. T., Saunders, M. A.
2014; 40 (2)
- **LSRN: A PARALLEL ITERATIVE SOLVER FOR STRONGLY OVER- OR UNDERDETERMINED SYSTEMS** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*
Meng, X., Saunders, M. A., Mahoney, M. W.
2014; 36 (2): C95-C118
- **PROXIMAL NEWTON-TYPE METHODS FOR MINIMIZING COMPOSITE FUNCTIONS** *SIAM JOURNAL ON OPTIMIZATION*
Lee, J. D., Sun, Y., Saunders, M. A.
2014; 24 (3): 1420-1443
- **Robust flux balance analysis of multiscale biochemical reaction networks** *BMC BIOINFORMATICS*
Sun, Y., Fleming, R. M., Thiele, I., Saunders, M. A.
2013; 14
- **Equispaced Pareto front construction for constrained bi-objective optimization** *MATHEMATICAL AND COMPUTER MODELLING*
Pereyra, V., Saunders, M., Castillo, J.
2013; 57 (9-10): 2122-2131
- **Robust flux balance analysis of multiscale biochemical reaction networks** *BMC Bioinformatics*
Fleming, R. M., Saunders, M. A.
2013; 14:240: 6
- **CG versus MINRES: An empirical comparison** *SQUJournal for Science*
Fong, D., C.-L., Saunders, M., A.
2012; 17:1: 44-62
- **A Higher-Order Generalized Singular Value Decomposition for Comparison of Global mRNA Expression from Multiple Organisms** *PLOS ONE*
Ponnappalli, S. P., Saunders, M. A., Van Loan, C. F., Alter, O.
2011; 6 (12)
- **MINRES-QLP: A KRYLOV SUBSPACE METHOD FOR INDEFINITE OR SINGULAR SYMMETRIC SYSTEMS** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*
Choi, S. T., Paige, C. C., Saunders, M. A.
2011; 33 (4): 1810-1836
- **Nonconservative Robust Control: Optimized and Constrained Sensitivity Functions** *IEEE TRANSACTIONS ON CONTROL SYSTEMS TECHNOLOGY*
Fransson, C., Wik, T., Lennartson, B., Saunders, M., Gutman, P.
2009; 17 (2): 298-308
- **STABILIZING POLICY IMPROVEMENT FOR LARGE-SCALE INFINITE-HORIZON DYNAMIC PROGRAMMING** *SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS*
O'Sullivan, M. J., Saunders, M. A.
2009; 31 (2): 434-459
- **Variational Bayesian image restoration based on a product of t-distributions image prior** *IEEE TRANSACTIONS ON IMAGE PROCESSING*

-
- Chantas, G., Galatsanos, N., Likas, A., Saunders, M.
2008; 17 (10): 1795-1805
- **George B. Dantzig and systems optimization** *DISCRETE OPTIMIZATION*
Gill, P. E., Murray, W., Saunders, M. A., Tomlin, J. A., Wright, M. H.
2008; 5 (2): 151-158
 - **Discussion: The Dantzig selector: Statistical estimation when p is much larger than n** *ANNALS OF STATISTICS*
Friedlander, M. P., Saunders, M. A.
2007; 35 (6): 2385-2391
 - **Commentary on Methods for modifying matrix factorizations** *Milestones in Matrix Computation: Selected Works of Gene H. Golub With Commentaries*
Saunders, M., A.
edited by Chan, R., H., Greif, C., O'Leary, D., P.
Oxford University Press.2007: 310–310
 - **SpaseLoc: An adaptive subproblem algorithm for scalable wireless sensor network localization** *SIAM JOURNAL ON OPTIMIZATION*
Carter, M. W., Jin, H. H., Saunders, M. A., Ye, Y.
2006; 17 (4): 1102-1128
 - **SNOPT: An SQP algorithm for large-scale constrained optimization (Reprinted from SIAM Journal Optimization, vol 12, pg 979-1006, 2002)** *SIAM REVIEW*
Gill, P. E., Murray, W., Saunders, M. A.
2005; 47 (1): 99-131
 - **A globally convergent linearly constrained Lagrangian method for nonlinear optimization** *SIAM JOURNAL ON OPTIMIZATION*
Friedlander, M. P., Saunders, M. A.
2005; 15 (3): 863-897
 - **Sparsity and smoothness via the fused lasso** *JOURNAL OF THE ROYAL STATISTICAL SOCIETY SERIES B-STATISTICAL METHODOLOGY*
Tibshirani, R., Saunders, M., Rosset, S., Zhu, J., Knight, K.
2005; 67: 91-108
 - **A bisection algorithm for the mixed mu upper bound and its supremum** *American Control Conference*
Fransson, C. M., Saunders, M. A.
IEEE.2004: 2665–2670
 - **Subspace preconditioned LSQR for discrete ill-posed problems** *Conference on Computational Linear Algebra with Applications*
Jacobsen, M., Hansen, P. C., Saunders, M. A.
SPRINGER.2003: 975–89
 - **SNOPT: An SQP algorithm for large-scale constrained optimization** *SIAM JOURNAL ON OPTIMIZATION*
Gill, P. E., Murray, W., Saunders, M. A.
2002; 12 (4): 979-1006
 - **Global controller optimization using Horowitz bounds**
Fransson, C., M., Lennartson, B., Wik, T., Holmstrom, K., Saunders, M., Gutman, P., O.
2002
 - **Atomic decomposition by basis pursuit** *SIAM REVIEW*
Chen, S. S., Donoho, D. L., Saunders, M. A.
2001; 43 (1): 129-159
 - **Atomic decomposition by basis pursuit** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*
Chen, S. S., Donoho, D. L., Saunders, M. A.
1998; 20 (1): 33-61
 - **SNOPT: A Fortran software package to solve large-scale optimization problems**
Gill, P., E., Murray, W., Saunders, M., A.

1998

- **OSSE mapping of galactic 511 keV positron annihilation line emission** *ASTROPHYSICAL JOURNAL*
Purcell, W. R., Cheng, L. X., Dixon, D. D., Kinzer, R. L., Kurfess, J. D., Leventhal, M., Saunders, M. A., Skibo, J. G., Smith, D. M., Tueller, J.
1997; 491 (2): 725-748
- **Computing projections with LSQR** *BIT NUMERICAL MATHEMATICS*
Saunders, M. A.
1997; 37 (1): 96-104
- **Non-parametric estimates of high energy gamma-ray source distributions** *4th Compton Symposium*
Dixon, D. D., Kolaczyk, E. D., Samimi, J., Saunders, M. A.
AIP PRESS.1997: 1601-5
- **Cholesky-based methods for sparse least squares: The benefits of regularization** *AMS/IMS/SIAM Summer Research Conference on Linear and Nonlinear Conjugate Gradient-Related Methods*
Saunders, M. A.
SIAM.1996: 92-100
- **SQP methods for large-scale optimization**
Gill, P. E., Murray, W., Saunders, M., A.
1996
- **On the stability of Cholesky factorization for symmetric quasidefinite systems** *SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS*
Gill, P. E., Saunders, M. A., Shinnerl, J. R.
1996; 17 (1): 35-46
- **Solution of sparse rectangular systems using LSQR and Craig** *BIT NUMERICAL MATHEMATICS*
Saunders, M. A.
1995; 35 (4): 588-604
- **Primal-dual methods for linear programming** *MATHEMATICAL PROGRAMMING*
Gill, P. E., Murray, W., PONCELEON, D. B., Saunders, M. A.
1995; 70 (3): 251-277
- **A PRACTICAL INTERIOR-POINT METHOD FOR CONVEX-PROGRAMMING** *SIAM JOURNAL ON OPTIMIZATION*
Jarre, F., Saunders, M. A.
1995; 5 (1): 149-171
- **MINOS(II) version 4.2: Analyzing infeasibilities in linear programming** *Eur. J. Oper. Res.*
Chinneck, J., W., Saunders, M., A.
1995; 81: 217-218
- **Fortran software for optimization**
Gill, P. E., Murray, W., Saunders, M., A.
1995
- **THE SIMPLEX ALGORITHM WITH A NEW PRIMAL AND DUAL PIVOT RULE** *OPERATIONS RESEARCH LETTERS*
Chen, H. D., Pardalos, P. M., Saunders, M. A.
1994; 16 (3): 121-127
- **SOLVING REDUCED KKT SYSTEMS IN BARRIER METHODS FOR LINEAR-PROGRAMMING** *15th Dundee Conference on Numerical Analysis*
Gill, P. E., Murray, W., PONCELEON, D. B., Saunders, M. A.
LONGMAN SCIENTIFIC & TECHNICAL.1994: 89-104
- **Fortran software for optimization** *1995 NSF Design and Manufacturing Grantees Conference*
Gill, P. E., Murray, W., Saunders, M. A.
SOC MANUFACTURING ENGINEERS.1994: 31-32
- **Large-scale SQP methods and their application in trajectory optimization** *Control Applications of Optimization*
Gill, P. E., Murray, W., Saunders, M., A.

- edited by Bulirsch, R., Kraft, D.
Birkhauser Verlag, Basel,Boston, Stuttgart.1994: 29–42
- **Solving reduced KKT systems in barrier methods for linear programming** *Numerical Analysis 1993*
Gill, P. E., Murray, W., Ponceleon, D., B., Saunders, M., A.
edited by Watson, G., A., Grffiths, D.
Pitman Research Notes in Mathematics 303, Longmans Press.1994: 89–104
 - **Major Cholesky would feel proud** *ORSA J. Comput.*
Saunders, M., A.
1994; 6: 23-27
 - **PRECONDITIONERS FOR INDEFINITE SYSTEMS ARISING IN OPTIMIZATION** *SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS*
Gill, P. E., Murray, W., PONCELEON, D. B., Saunders, M. A.
1992; 13 (1): 292-311
 - **Some theoretical properties of an augmented Lagrangian merit function** *Advances in Optimization and Parallel Computing*
Gill, P. E., Murray, W., Saunders, M., A., Wright, M., H.
edited by Pardalos, P., M.
North-Holland, Amsterdam.1992: 101–128
 - **The application of nonlinear programming and collocation to optimal aeroassisted orbital transfers**
Shi, Y., Y., Nelson, R., Young, D., H., Gill, P. E., Murray, W., Saunders, M., A.
1992
 - **A BLOCK-LU UPDATE FOR LARGE-SCALE LINEAR-PROGRAMMING** *SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS*
ELDERSVELD, S. K., Saunders, M. A.
1992; 13 (1): 191-201
 - **INERTIA-CONTROLLING METHODS FOR GENERAL QUADRATIC-PROGRAMMING** *SIAM REVIEW*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1991; 33 (1): 1-36
 - **An adaptive primal-dual method for linear programming** *Math.Prog. Soc., Committee on Algorithms Newsletter*
Jarre, F., Saunders, M., A.
1991; 19: 7-16
 - **A Schur-complement method for sparse quadratic programming** *Reliable Numerical Computation*
Gill, P. E., Murray, W., Saunders, M., A., Wright, M., H.
edited by Cox, M., G., Hammarling, S.
Oxford University Press, Oxford and New York.1990: 113–138
 - **A PRACTICAL ANTICYCLING PROCEDURE FOR LINEARLY CONSTRAINED OPTIMIZATION** *MATHEMATICAL PROGRAMMING*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1989; 45 (3): 437-474
 - **Constrained nonlinear programming** *Optimization Handbooks in Operations Research and Management Science*
Gill, P. E., Murray, W., Saunders, M., A., Wright, M., H.
edited by Nemhauser, G., L., G., A., H., Kan, R.
North-Holland, Amsterdam.1989: 171–210
 - **2 CONJUGATE-GRADIENT-TYPE METHODS FOR UNSYMMETRIC LINEAR-EQUATIONS** *SIAM JOURNAL ON NUMERICAL ANALYSIS*
Saunders, M. A., Simon, H. D., YIP, E. L.
1988; 25 (4): 927-940
 - **RECENT DEVELOPMENTS IN CONSTRAINED OPTIMIZATION** *JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1988; 22 (2-3): 257-270
 - **Two conjugate-gradient-type methods for unsymmetric linear equations** *SIAM J. Numer. Anal.*

-
- Saunders, M., A., Simon, H., D., Yip, E., L.
1988; 25: 927-940
- **GAMS/MINOS GAMS: A User's Guide**
Gill, P., E., Murray, W., Murtagh, B., A., Saunders, M., A., Wright, M., H.
edited by Brooke, A., Kendrick, D., Meeraus, A.
The Scientific Press.1988: 201–224
 - **MAINTAINING LU FACTORS OF A GENERAL SPARSE-MATRIX LINEAR ALGEBRA AND ITS APPLICATIONS**
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1987; 88-9: 239-270
 - **ON PROJECTED NEWTON BARRIER METHODS FOR LINEAR-PROGRAMMING AND AN EQUIVALENCE TO KARMARKAR PROJECTIVE METHOD MATHEMATICAL PROGRAMMING**
Gill, P. E., Murray, W., Saunders, M. A., Tomlin, J. A., Wright, M. H.
1986; 36 (2): 183-209
 - **CONSIDERATIONS OF NUMERICAL-ANALYSIS IN A SEQUENTIAL QUADRATIC-PROGRAMMING METHOD LECTURE NOTES IN MATHEMATICS**
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1986; 1230: 46-62
 - **Considerations of numerical analysis in sequential quadratic programming methods Numerical Analysis**
Gill, P., E., Murray, W., Saunders, M., A., Wright, M., H.
edited by Hennart, J., P.
Springer-Verlag, New York and London.1986: 46–62
 - **PROPERTIES OF A REPRESENTATION OF A BASIS FOR THE NULL SPACE MATHEMATICAL PROGRAMMING**
Gill, P. E., Murray, W., Saunders, M. A., Stewart, G. W., Wright, M. H.
1985; 33 (2): 172-186
 - **Software and its relationship to methods Numerical Optimization 1984**
Gill, P., E., Murray, W., Saunders, M., A., Wright, M., H.
edited by Boggs, P., T., Byrd, R., H., B., R.
SIAM, Philadelphia.1985: 139–159
 - **Model building and practical aspects of nonlinear programming Computational Mathematical Programming**
Gill, P., E., Murray, W., Saunders, M., A., Wright, M., H.
edited by Schittkowski, K.
NATO ASI, Springer-Verlag, Berlin and New York.1985: 209–247
 - **PROCEDURES FOR OPTIMIZATION PROBLEMS WITH A MIXTURE OF BOUNDS AND GENERAL LINEAR CONSTRAINTS ACM TRANSACTIONS ON MATHEMATICAL SOFTWARE**
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1984; 10 (3): 282-298
 - **Sequential quadratic programming methods for nonlinear programming Computer Aided Analysis and Optimization of Mechanical System Dynamics**
Gill, P., E., Murray, W., Saunders, M., A., Wright, M., H.
edited by Haug, E., J.
NATO ASI.1984: 679–697
 - **SPARSE-MATRIX METHODS IN OPTIMIZATION SIAM JOURNAL ON SCIENTIFIC AND STATISTICAL COMPUTING**
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1984; 5 (3): 562-589
 - **TRENDS IN NONLINEAR-PROGRAMMING SOFTWARE EUROPEAN JOURNAL OF OPERATIONAL RESEARCH**
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1984; 17 (2): 141-149

- **AQUIFER RECLAMATION DESIGN - THE USE OF CONTAMINANT TRANSPORT SIMULATION COMBINED WITH NONLINEAR-PROGRAMMING** *WATER RESOURCES RESEARCH*
Gorelick, S. M., Voss, C. I., Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1984; 20 (4): 415-427
- **A WEIGHTED GRAM-SCHMIDT METHOD FOR CONVEX QUADRATIC-PROGRAMMING** *MATHEMATICAL PROGRAMMING*
Gill, P. E., Gould, N. I., Murray, W., Saunders, M. A., Wright, M. H.
1984; 30 (2): 176-195
- **COMPUTING FORWARD-DIFFERENCE INTERVALS FOR NUMERICAL OPTIMIZATION** *SIAM JOURNAL ON SCIENTIFIC AND STATISTICAL COMPUTING*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1983; 4 (2): 310-321
- **ALGORITHM-583 - LSQR - SPARSE LINEAR-EQUATIONS AND LEAST-SQUARES PROBLEMS** *ACM TRANSACTIONS ON MATHEMATICAL SOFTWARE*
Paige, C. C., Saunders, M. A.
1982; 8 (2): 195-209
- **Software for constrained optimization** *Nonlinear Optimization 1981*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
edited by Powell, M. J. D.
Academic Press, London and New York.1982: 381–393
- **Linearly constrained optimization** *Nonlinear Optimization 1981*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
edited by Powell, M. J. D.
Academic Press, London and New York.1982: 123–139
- **LSQR - AN ALGORITHM FOR SPARSE LINEAR-EQUATIONS AND SPARSE LEAST-SQUARES** *ACM TRANSACTIONS ON MATHEMATICAL SOFTWARE*
Paige, C. C., Saunders, M. A.
1982; 8 (1): 43-71
- **A NOTE ON A SUFFICIENT-DECREASE CRITERION FOR A NON-DERIVATIVE STEP-LENGTH PROCEDURE** *MATHEMATICAL PROGRAMMING*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
1982; 23 (3): 349-352
- **A PROJECTED LAGRANGIAN ALGORITHM AND ITS IMPLEMENTATION FOR SPARSE NON-LINEAR CONSTRAINTS** *MATHEMATICAL PROGRAMMING STUDY*
Murtagh, B. A., Saunders, M. A.
1982; 16 (MAR): 84-117
- **TOWARDS A GENERALIZED SINGULAR VALUE DECOMPOSITION** *SIAM JOURNAL ON NUMERICAL ANALYSIS*
Paige, C. C., Saunders, M. A.
1981; 18 (3): 398-405
- **QP-based methods for large-scale nonlinearly constrained optimization** *Nonlinear Programming 4*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
edited by Mangasarian, O. L., Meyer, R. R., M., S.
Academic Press London and New York.1981: 57–98
- **A numerical investigation of ellipsoid algorithms for large-scale linear programming** *Large-scale Linear Programming*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.
edited by Dantzig, G. B., Dempster, M. A.H., Kallio, M.
axenburg, Austria.1981: 487–509
- **ASPECTS OF MATHEMATICAL-MODELING RELATED TO OPTIMIZATION** *APPLIED MATHEMATICAL MODELLING*
Gill, P. E., Murray, W., Saunders, M. A., Wright, M. H.

1981; 5 (2): 71-83

- **Methods for large-scale nonlinear optimization** *Electric Power Problems: The Mathematical Challenge*
Gill, P. E., Murray, W., Saunders, M., A., Wright, M., H.
edited by Erisman, A. M., Neves, K. W., Dwarakanath, M., H.
SIAM, Philadelphia.1980: 352–377
- **Sparse least squares by conjugate gradients: a comparison of preconditioning methods**
Saunders, M., A.
1979
- **LARGE-SCALE LINEARLY CONSTRAINED OPTIMIZATION** *MATHEMATICAL PROGRAMMING*
Murtagh, B. A., Saunders, M. A.
1978; 14 (1): 41-72
- **LEAST-SQUARES ESTIMATION OF DISCRETE LINEAR DYNAMIC-SYSTEMS USING ORTHOGONAL TRANSFORMATIONS** *SIAM JOURNAL ON NUMERICAL ANALYSIS*
Paige, C. C., Saunders, M. A.
1977; 14 (2): 180-193
- **NONLINEAR OPTIMIZATION SUBJECT TO LINEAR-PROGRAMMING CONSTRAINTS**
Saunders, M.
SIAM PUBLICATIONS.1976: 825–26
- **A fast, stable implementation of the simplex method using Bartels-Golub updating** *Sparse Matrix Computations*
Saunders, M., A.
edited by Bunch, J., R., Rose, D., J.
Academic Press.1976: 213–226
- **The complexity of LU updating in the simplex method** *The Complexity of Computational Problem Solving*
Saunders, M., A.
edited by Brent, R., P.
University of Queensland Press.1976: 214–230
- **SOLUTION OF SPARSE INDEFINITE SYSTEMS OF LINEAR EQUATIONS** *SIAM JOURNAL ON NUMERICAL ANALYSIS*
Paige, C. C., Saunders, M. A.
1975; 12 (4): 617-629
- **METHODS FOR COMPUTING AND MODIFYING LDV FACTORS OF A MATRIX** *MATHEMATICS OF COMPUTATION*
Gill, P. E., Murray, W., Saunders, M. A.
1975; 29 (132): 1051-1077
- **Methods for computing and modifying the LDV factors of a matrix** *Math. Comput.*
Gill, P. E., Saunders, M. A.
1975; 29: 1051-1077
- **METHODS FOR MODIFYING MATRIX FACTORIZATIONS** *MATHEMATICS OF COMPUTATION*
Gill, P. E., Golub, G. H., Murray, W., Saunders, M. A.
1974; 28 (126): 505-535
- **Numerical stability in large-scale linear programming** *Approximation and Accuracy*
Saunders, M., A.
edited by deHoog, F., R., Jarvis, C., L.
University of Queensland Press.1973: 144–158
- **Descent methods for minimization** *Optimization*
Osborne, M., R., Saunders, M., A.
edited by Ryan, D., M.
University of Queensland Press.1972: 221–237

- **Linear least squares and quadratic programming** *Integer and Nonlinear Programming*
Golub, G., H., Saunders, M., A.
edited by Abadie, J.
North-Holland, Amsterdam.1970: 229–256
- **Numerical techniques in mathematical programming** *Nonlinear Programming*
Bartels, R., H., Golub, G., H., Saunders, M., A.
edited by Rosen, J., B., Mangasarian, O., L., Ritter, K.
Academic Press, London and New York.1970: 123–176
- **Sparse least squares by conjugate gradients: a comparison of preconditioning methods**
M.
edited by J.
University of Waterloo, Waterloo, Ontario, Canada