

CURRICULUM VITAE

ROBERT J. VANDERBEI

Dept. of Operations Research and Financial Engineering
Princeton University
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RESEARCH INTERESTS

Broadly viewed, my research interests are in algorithms for nonlinear optimization and their application to problems arising in engineering and science. Application areas of interest focus mainly on inverse Fourier transform optimization problems and action minimization problems with a special interest in applying these techniques to the design of NASA's terrestrial planet finder space telescope.

EMPLOYMENT/POSITIONS

Princeton University	
Professor, Operations Research and Financial Engineering	1999 –
Department Chair, Operations Research and Financial Engineering	2005 –
Affiliated Member, Astrophysics	2006 –
Affiliated Member, Bendheim Center for Finance	2004 –
Affiliated Member, Mathematics	2003 –
Affiliated Member, Computer Science	2000 –
Affiliated Member, Program in Applied and Computational Mathematics	1994 –
Professor, Civil Engineering and Operations Research	1996 – 1999
Associate Professor, Civil Engineering and Operations Research	1991 – 1996
Visiting Lecturer, Civil Engineering and Operations Research	1990 – 1991
AT&T Bell Laboratories	
Member of Technical Staff, Mathematics Research Center	1987 – 1991
Member of Technical Staff, Advanced Decision Support Systems	1985 – 1987
Member of Technical Staff, Performance Analysis Department	1984 – 1985
University of Illinois at Champaign-Urbana	
Visiting Lecturer, Mathematics	1982 – 1984
Courant Institute of Mathematical Sciences at NYU	
NSF Mathematical Sciences Postdoctoral Research Fellow	1981 – 1982

EDUCATION

Cornell University	
Ph.D. in Applied Mathematics	May 1981
Dissertation Title: "Toward a Stochastic Calculus for Several Markov Processes"	
M.S. in Applied Mathematics	May 1979
Rensselaer Polytechnic Institute	
M.S. in Operations Research and Statistics	May 1978
B.S. in Chemistry	May 1976

PLENARY ADDRESSES

Extreme Optics and the Search for Earth-Like Planets ISMP-2006, Rio de Janeiro, August 2006.
Nonlinear Programming and Engineering Applications (tutorial) INFORMS, Denver, October 2004.
Engineering Applications of Nonlinear Optimization AIRO, Venice Italy, September 2003.
New Directions in Linear Programming INFORMS, Miami Beach, FL, October 2001.
Interior-point methods for nonlinear programming and Interior-point methods for second-order cone programming and semidefinite programming, Fifth International Conference on High Performance Optimization Techniques, Rotterdam, NETHERLANDS, June 2000.
Interior-point methods for nonlinear programming and Interior-point methods for second-order cone programming and semidefinite programming, Twenty-fifth Conference on the Mathematics of Operations Research, Lunteren, NETHERLANDS, January 2000.
Nonlinear Optimization: Algorithms and Models Large-Scale Nonlinear Optimization, Erice, SICILY, July 2001.
Switching among Several Brownian Motions, Twentieth Conference on Stochastic Processes and their Applications, Nahariya, ISRAEL, June 1991.
Interior Methods for Linear Programming, Operations Research Society of Israel, Tel-Aviv University, ISRAEL, May 1987.
Constructing Strong Markov Processes, Twelfth Midwest Probability Symposium, Northwestern University, October 1984.

GRANTS

Jet Propulsion Laboratory \$45,000/yr (2004–2005) *Concept Study of Pupil Mapping for High-Contrast Imaging*, principal investigator
Ball Aerospace \$25,000/yr (2005–2005) *Truss-topology optimization for the High-Contrast Imaging Testbed*, principal investigator
Jet Propulsion Laboratory \$30,000/yr (2001–2006) *Optimizing the Design of High-Contrast Coronagraph for the Terrestrial Planet Finder*, principal investigator
Office of Naval Research. \$60,000/yr (1997–2008) *Interior-Point Methods for Nonlinear Optimization and Complementarity*, principal investigator
National Science Foundation. \$60,000/yr (1995–2004) *Interior Point Methods for Large Scale Nonlinear Programming*, principal investigator
Air Force Office of Scientific Research \$120,000/yr (1991–1998) *Robust Optimization of Large-Scale Systems: An Emerging Technology*, principal investigator

Co-investigator on several other grants

UNIVERSITY SERVICE

Committee Member, Grading 2008–2009.
Committee Member, Promotion and Tenure (C/3) 2007–2008.
Committee Chair, Classrooms and Schedules 2005–2007.
Committee Member, Course of Study 2003–2005.
Program Director, Engineering and Management Systems, 1994–2003.
Committee Member, Engineering and Management Systems Program, 1991–1994.
Committee Member, Course of Study 2001–

PROFESSIONAL ACTIVITIES

Chair-Elect, INFORMS Computing Society, 2008-2010.
Chair, SIAG-OPT Optimization Prize Committee 2005,2008.
Vice-Chair, SIAG-OPT, 2004-2008.
Chair, INFORMS Expository Writing Award Committee, 2003.

Member, INFORMS Expository Writing Award Committee, 2001-2002.
 Chair, INFORMS Optimization Section, 2000-2001.
 Member, INFORMS Computing Society Prize Committee, 1999-2000.
 Member, Advisory Board, Dept. of Industrial and Operations Engineering, University of Michigan, 1995-2000.
 Chair, INFORMS Optimization Section Prize Committee, 1999-2000.
 Chair, INFORMS Optimization Section, 1999-2000.
 Member, Nicholson Prize Committee, 1995.
 Member, Beale-Orchard Hayes Award Committee, 1993-1994.
 Chair, Beale-Orchard Hayes Award Committee, 1995-1997.

EDITORIAL POSITIONS

Editorial Advisory Board, *Mathematical Programming Computation*, 2008–.
 Associate Editor, *Mathematical Programming*, 2003–2005.
 Associate Editor, *Optimization in Engineering*, 2001–2005.
 Associate Editor, *INFORMS Journal on Computing*, 1991–2001.

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

American Mathematical Society (AMS)	1977-
Society for Industrial and Applied Mathematics (SIAM), Member	1990-
Mathematical Association of America (MAA)	1987-1990
Operations Research Society of America (ORSA)	1985-1994
Institute for Operations Research and Management Sciences (INFORMS), Fellow	1994-
Institute for Mathematical Statistics (IMS)	1980-2001
Bernoulli Society	1983-2001
Mathematical Programming Society (MPS)	1985-
SPIE	2002-
American Astrophysical Society (AAS)	2002-
Sigma Xi	2005-
American Society of Engineering Education (ASEE), Member	2005-

MOST FREQUENTLY CITED PUBLICATIONS (as of January 1, 2009)

- [1] R.J. Vanderbei. *Linear Programming: Foundations and Extensions*. Kluwer Academic Publishers, 2nd edition, 2001.
- [2] R.J. Vanderbei. LOQO: An interior point code for quadratic programming. *Optimization Methods and Software*, 12:451–484, 1999.
- [3] C. Helmberg, F. Rendl, R.J. Vanderbei, and H. Wolkowicz. An interior point method for semidefinite programming. *SIAM Journal on Optimization*, 6:342–361, 1996.
- [4] R.J. Vanderbei and D.F. Shanno. An Interior-Point Algorithm for Nonconvex Nonlinear Programming. *Computational Optimization and Applications*, 13:231–252, 1999.
- [5] J.M. Mulvey, R.J. Vanderbei, and S.A. Zenios. Robust optimization of large scale systems. *Operations Research*, 43(2):264–281, 1995.
- [6] N.J. Kasdin, R.J. Vanderbei, D.N. Spergel, and M.G. Littman. Extrasolar Planet Finding via Optimal Apodized and Shaped Pupil Coronagraphs. *Astrophysical Journal*, 582:1147–1161, 2003.
- [7] R.J. Vanderbei. Appendix A: Discrete space markov processes. In *Large Deviations for Performance Analysis* by A. Weiss and A. Shwartz, pages 499–514. Chapman-Hall, 1995.
- [8] R.J. Vanderbei, M.S. Meketon, and B.F. Freedman. A modification of Karmarkar’s linear programming algorithm. *Algorithmica*, 1:395–407, 1986.
- [9] R.J. Vanderbei. Symmetric quasi-definite matrices. *SIAM Journal on Optimization*, 5(1):100–113, 1995.

- [10] H.Y. Benson, D.F. Shanno, and R.J. Vanderbei. Interior-Point Methods for Nonconvex Nonlinear Programming: Jamming and Numerical Testing. *Mathematical Programming*, 99(1):35–48, 2004.
- [11] R.J. Vanderbei, D.N. Spergel, and N.J. Kasdin. Spiderweb Masks for High Contrast Imaging. *Astrophysical Journal*, 590:593–603, 2003.
- [12] H.Y. Benson, A. Sen, D.F. Shanno, and R.J. Vanderbei. Interior-point algorithms, penalty methods and equilibrium problems. *Computational Optimization and Applications*, 34(2):155–182, June 2006.
- [13] R.J. Vanderbei, D.N. Spergel, and N.J. Kasdin. Circularly Symmetric Apodization via Starshaped Masks. *Astrophysical Journal*, 599:686–694, 2003.

BOOKS

- [1] R.J. Vanderbei. *Linear Programming: Foundations and Extensions*. Kluwer Academic Publishers, 1997.
- [2] R.J. Vanderbei. *Linear Programming: Foundations and Extensions*. Kluwer Academic Publishers, 1998. Paperback edition.
- [3] R.J. Vanderbei. *Linear Programming: Foundations and Extensions*. Kluwer Academic Publishers, 2nd edition, 2001.
- [4] R.J. Vanderbei. *Linear Programming: Foundations and Extensions*. Springer, 3rd edition, 2007.

REFEREED JOURNAL PUBLICATIONS

- [1] R.J. Vanderbei. Eliminating poisson’s spot with linear programming. In J.W. Chinneck, B. Kristjansson, and M. Saltzman, editors, *Operations Research and Cyber-Infrastructure*. Springer, 2009.
- [2] R.J. Vanderbei. The Earth Is Not Flat: An Analysis of a Sunset Photo. *Optics and Photonics News*, November:34–39, 2008.
- [3] R.J. Vanderbei. Linear Stability of Ring Systems Around Oblate Central Masses. *Advances in Space Research*, 42:1370–1377, 2008.
- [4] R.J. Vanderbei. Extreme Optics and the Search for Earth-Like Planets. *Mathematical Programming Series B*, 112(1):255–272, 2008.
- [5] I. Griva, D.F. Shanno, R.J. Vanderbei, and H.Y. Benson. Global convergence of a primal-dual interior-point method for nonlinear programming. *Algorithmic Operations Research*, 3(1):12–19, 2008.
- [6] J.C. Lagarias, E. Rains, and R.J. Vanderbei. The Kruskal Count. In S. Brams et al., editor, *The Mathematics of Preference, Choice, and Order: Essays in Honor of Peter C. Fishburn*. Springer-Verlag, 2008.
- [7] R.J. Vanderbei, E. Cady, and N.J. Kasdin. Optimal occulter design for finding extrasolar planets. *Astrophysical Journal*, 665(1):794–798, 2007.
- [8] N.J. Kasdin, R.J. Vanderbei, and R. Belikov. Shaped pupil coronagraphy. *C.R. Physique*, 8:312–322, 2007.
- [9] R.J. Vanderbei and R. Belikov. Measuring the astronomical unit from your backyard. *Sky and Telescope*, 113(1):91–94, 2007.
- [10] R.J. Vanderbei. A Simple Approximate Analysis of the Linear Stability of Ring Systems. In *New Trends in Astrodynamics and Applications III*, volume 886, pages 169–174. American Institute of Physics, 2007.
- [11] R.J. Vanderbei and E. Kolemen. Linear Stability of Ring Systems. *Astronomical Journal*, 133(2):656–664, 2007.
- [12] R. Soummer, L. Pueyo, A. Sivaramkrishnan, and R.J. Vanderbei. Fast computation of lyot-style coronagraph propagation. *Optics Express*, 15(24):15935–15951, 2007.
- [13] H.Y. Benson, A. Sen, D.F. Shanno, and R.J. Vanderbei. Interior-point algorithms, penalty methods and equilibrium problems. *Comp. Opt. and Appl.*, 34:155–182, 2006.
- [14] R. Belikov, N.J. Kasdin, and R.J. Vanderbei. Diffraction-Based Sensitivity Analysis of Apodized Pupil Mapping Systems. *Astrophysical Journal*, 652:833, 2006.
- [15] Give’on A., Kasdin N. J., Vanderbei R. J., and Avitzour Y. On representing and correcting wavefront errors in high-contrast imaging systems. *Journal of the Optical Society of America A*, 23, May 2006.
- [16] N. J. Kasdin, R. J. Vanderbei, M. G. Littman, D. Ren, M. Carr, and D. N. Spergel. Optimal Designs, Mask Manufacture, and Experimental Results for Shaped Pupil Coronagraphs. *Bulletin of the American*

- Astronomical Society*, 205:514–+, December 2004.
- [17] A. Giveón, N. J. Kasdin, M. G. Littman, L. A. Pueyo, and R. J. Vanderbei. Adaptive Optics for High-Contrast Imaging. *Bulletin of the American Astronomical Society*, 205:515–+, December 2004.
 - [18] R.J. Vanderbei. Horsing Around on Saturn. In *New Trends in Astrodynamics and Applications*, volume 1065, pages 336–345. NY Academy of Sciences, 2005.
 - [19] R.J. Vanderbei. Diffraction Analysis of 2-D Pupil Mapping for High-Contrast Imaging. *Astrophysical Journal*, 636:528, 2006.
 - [20] I. Griva and R.J. Vanderbei. Case Studies in Trajectory Optimization: Catenary Problem. *Optimization and Engineering*, 6:463–482, 2005.
 - [21] R.J. Vanderbei and W.A. Traub. Pupil Mapping in 2-D for High-Contrast Imaging. *Astrophysical Journal*, 626:1079–1090, 2005.
 - [22] N.J. Kasdin, R.A. Brown, C.J. Burrows, S. Kilston, M. Kuchner, M.G. Littman, M.C. Noecker, S. Seager, R. J. Vanderbei, and R.A. Woodruff. An optical/UV space coronagraph concept for the terrestrial planet finder. *Advances in Space Research*, 34(3):625–630, 2004.
 - [23] R. J. Vanderbei, N. J. Kasdin, and D. N. Spergel. Checkerboard-Mask Coronagraphs for High-Contrast Imaging. *Astrophysical Journal*, 615(1):555, 2004.
 - [24] N.J. Kasdin, R.J. Vanderbei, M.G. Littman, and D.N. Spergel. Optimal one-dimensional apodizations and shaped pupils for planet finding coronagraphy. *Applied Optics*, 44(7):1117–1128, 2005.
 - [25] H.Y. Benson, D.F. Shanno, and R.J. Vanderbei. Interior-Point Methods for Nonconvex Nonlinear Programming: Jamming and Numerical Testing. *Mathematical Programming*, 99(1):35–48, 2004.
 - [26] W.A. Traub and R.J. Vanderbei. Two-Mirror Apodization for High-Contrast Imaging. *Astrophysical Journal*, 599:695–701, 2003.
 - [27] R.J. Vanderbei, D.N. Spergel, and N.J. Kasdin. Circularly Symmetric Apodization via Starshaped Masks. *Astrophysical Journal*, 599:686–694, 2003.
 - [28] W. Simmons, N.J. Kasdin, R.J. Vanderbei, and W. Cash. System concept design for the new worlds observer. *Bulletin of the American Astronomical Society*, 35:1205, 2003.
 - [29] R.J. Vanderbei, D.N. Spergel, and N.J. Kasdin. Spiderweb Masks for High Contrast Imaging. *Astrophysical Journal*, 590:593–603, 2003.
 - [30] A. Ruszczyński and R.J. Vanderbei. Frontiers of Stochastically Nondominated Portfolios. *Econometrica*, 71(4):1287–1297, 2003.
 - [31] R.J. Vanderbei and H.Y. Benson. Solving Problems with Semidefinite and Related Constraints Using Interior-Point Methods for Nonlinear Programming. *Mathematical Programming*, 95:279–302, 2003.
 - [32] N.J. Kasdin, R.J. Vanderbei, D.N. Spergel, and M.G. Littman. Extrasolar Planet Finding via Optimal Apodized and Shaped Pupil Coronagraphs. *Astrophysical Journal*, 582:1147–1161, 2003.
 - [33] H.Y. Benson, D.F. Shanno, and R.J. Vanderbei. Interior-Point Methods for Nonconvex Nonlinear Programming: Filter Methods and Merit Functions. *Computational Optimization and Applications*, 23:257–272, 2002.
 - [34] S. Kruk, M. Muramatsu, R. Rendl, R.J. Vanderbei, and H. Wolkowicz. The Gauss-Newton Direction in Semidefinite Programming. *Optimization Methods and Software*, 15(1):1–27, 2001.
 - [35] R.J. Vanderbei. Case Studies in Trajectory Optimization: Trains, Planes, and Other Pastimes. *Optimization and Engineering*, 2:215–243, 2001.
 - [36] D.F. Shanno and R.J. Vanderbei. Interior-Point Methods for Nonconvex Nonlinear Programming: Orderings and Higher-Order Methods. *Math. Prog.*, 87(2):303–316, 2000.
 - [37] R.J. Vanderbei. LOQO: An interior point code for quadratic programming. *Optimization Methods and Software*, 12:451–484, 1999.
 - [38] R.J. Vanderbei. LOQO User’s Manual—Version 3.10. *Optimization Methods and Software*, 12:485–514, 1999.
 - [39] R.J. Vanderbei and D.F. Shanno. An Interior-Point Algorithm for Nonconvex Nonlinear Programming. *Computational Optimization and Applications*, 13:231–252, 1999.
 - [40] R.J. Vanderbei. Extension of Piyavskii’s Algorithm to Continuous Global Optimization. *J. Global Opt.*, 14:205–216, 1999.
 - [41] M. Muramatsu and R.J. Vanderbei. Primal-Dual Affine-Scaling Algorithms Fail for Semidefinite Programming. *Mathematics of Operations Research*, 24(1):149–175, 1999.

- [42] A. Kagan, C. Mallows, L.A. Shepp, R.J. Vanderbei, and Y. Vardi. Symmetrization of Binary Random Variables. *Bernoulli*, 5(6):1013–1020, 1999.
- [43] P. Fishburn, P. Schwander, L.A. Shepp, and R.J. Vanderbei. The discrete Radon transform and its approximate inversion via linear programming. *Disc. Appl. Math.*, 75:39–61, 1997.
- [44] A.J. Berger, J.M. Mulvey, E. Rothberg, and R.J. Vanderbei. Solving multistage stochastic programs using tree dissection. *SIAM Journal on Optimization*, 1996. To appear.
- [45] J.M. Mulvey, R.J. Vanderbei, and S.A. Zenios. Robust optimization of large scale systems. *Operations Research*, 43(2):264–281, 1995.
- [46] C. Helmberg, F. Rendl, R.J. Vanderbei, and H. Wolkowicz. An interior point method for semidefinite programming. *SIAM Journal on Optimization*, 6:342–361, 1996.
- [47] F. Rendl, R.J. Vanderbei, and H. Wolkowicz. Max-min eigenvalue problems, primal-dual interior point algorithms, and trust region subproblems. *Optimization Methods and Software*, 5:1–16, 1995.
- [48] R.J. Vanderbei. A probabilistic formula for the concave hull of a function. *Ann. Prob.*, 23:2014–2021, 1995.
- [49] L.A. Shepp and R.J. Vanderbei. The complex zeros of random polynomials. *Transactions of the AMS*, 347(11):4365–4384, 1995.
- [50] R.J. Vanderbei and B. Yang. The simplest semidefinite programs are trivial. *Math. of OR*, 20:590–596, 1995.
- [51] R.J. Vanderbei. Affine-scaling trajectories associated with a semi-infinite linear program. *Math. of OR*, 20:163–174, 1995.
- [52] R.J. Vanderbei. Symmetric quasi-definite matrices. *SIAM Journal on Optimization*, 5(1):100–113, 1995.
- [53] R.J. Vanderbei. Interior-point methods: algorithms and formulations. *ORSA J. on Computing*, 6:32–34, 1994.
- [54] L.A. Hall and R.J. Vanderbei. Two-thirds is sharp for affine scaling. *OR Letters*, 13:197–201, 1993.
- [55] R.J. Vanderbei and T.J. Carpenter. Symmetric indefinite systems for interior-point methods. *Mathematical Programming*, 58:1–32, 1993.
- [56] R.J. Vanderbei. ALPO: Another linear program optimizer. *ORSA J. on Computing*, 5:134–146, 1993.
- [57] J.R. Birge, R.M. Freund, and R.J. Vanderbei. Prior reduced fill-in in solving equations in interior point algorithms. *OR Letters*, 11:195–198, 1992.
- [58] R.J. Vanderbei. Optimal switching among several brownian motions. *SIAM Journal on Control and Optimization*, 30:1150–1162, 1992.
- [59] R.J. Vanderbei. A brief description of ALPO. *OR Letters*, pages 531–534, 1991.
- [60] R.J. Vanderbei. Splitting dense columns in sparse linear systems. *Lin. Alg. and Appl.*, 152:107–117, 1991.
- [61] A. Greenberg and R.J. Vanderbei. Quicker convergence for iterative numerical solutions to stochastic problems: probabilistic interpretation, ordering heuristics, and parallel processing. *Prob. in the Eng. and Info. Sci.*, 4:493–521, 1990.
- [62] R.J. Vanderbei. A martingale system theorem for stock investments. *OR Letters*, 9:155–159, 1990.
- [63] A. Mandelbaum, L.A. Shepp, and R.J. Vanderbei. Optimal switching between a pair of Brownian motions. *Ann. Prob.*, 18:1010–1033, 1990.
- [64] Y.C. Cheng, D.J. Houck, J.M. Liu, M.S. Meketon, L. Slutsman, R.J. Vanderbei, and P. Wang. The AT&T KORBX system. *AT&T Tech. Journal*, 68:7–19, 1989.
- [65] R.J. Vanderbei. Affine scaling for linear programs with free variables. *Mathematical Programming*, 43:31–44, 1989.
- [66] L.A. Shepp and R.J. Vanderbei. A probabilistic model for the time to unravel a strand of DNA. *Stochastic Models*, 4:299–314, 1988.
- [67] R.J. Vanderbei, M.S. Meketon, and B.F. Freedman. A modification of Karmarkar’s linear programming algorithm. *Algorithmica*, 1:395–407, 1986.
- [68] R.J. Vanderbei. Probabilistic solution of the Dirichlet problem for biharmonic functions in discrete space. *Ann. Prob.*, 12:311–324, 1984.
- [69] G.F. Lawler and R.J. Vanderbei. Markov strategies for optimal control problems indexed by a partially ordered set. *Ann. Prob.*, 11:642–647, 1982.
- [70] E.B. Dynkin and R.J. Vanderbei. Stochastic waves. *Transactions of the AMS*, 275:771–779, 1983.

- [71] R.J. Vanderbei. Toward a stochastic calculus for several markov processes. *Adv. Appl. Math.*, 4:125–144, 1983.
- [72] A. Mandelbaum and R.J. Vanderbei. Optimal stopping and supermartingales over partially ordered sets. *Z. Warsch. verw. Gebiete*, 57:253–264, 1981.
- [73] R.J. Vanderbei. Optimal choice of a subset of a population. *Math. OR*, 5:481–486, 1980.

ARTICLES SUBMITTED TO REFEREED JOURNALS
(TECHNICAL REPORTS)

- [1] R.J. Vanderbei. Linear Stability of Lagrange Points: Complex Variable Notation . Technical report, Department of Operations Research and Financial Engineering, Princeton University, 2006.
- [2] R.J. Vanderbei. Lagrange Points for Eccentric Planar 3-Body Systems . Technical report, Department of Operations Research and Financial Engineering, Princeton University, 2006.
- [3] H.Y. Benson, D.F. Shanno, and R.J. Vanderbei. A Comparative Study of Large-Scale Nonlinear Optimization Algorithms. Technical Report ORFE 01-04, Department of Operations Research and Financial Engineering, Princeton University, 2001.
- [4] R.J. Vanderbei and H. Yurttan. Using LOQO to Solve Second-Order Cone Programming Problems. Technical Report SOR-98-09, Statistics and Operations Research, Princeton University, 1998. Submitted *Optimization and Engineering*.
- [5] J.C. Lagarias, E. Rains, and R.J. Vanderbei. The Kruskal Count. Technical report, Princeton University, 1998.
- [6] R.J. Vanderbei and J. Iannone. An EM approach to OD matrix estimation. Technical Report SOR 94-04, Princeton University, 1994.
- [7] R.J. Vanderbei, A. Duarte, and B. Yang. An algorithmic and numerical comparison of several interior-point methods. Technical Report SOR 94-05, Princeton University, 1994.
- [8] A. Duarte and R.J. Vanderbei. A computational analysis of quasi-definite systems in interior-point algorithms. Technical Report SOR 94-11, Princeton University, 1994.
- [9] A. Duarte and R.J. Vanderbei. Interior point algorithms for LSAD and LMAD estimation. Technical Report SOR 94-07, Princeton University, 1994.

OTHER REFEREED PUBLICATIONS

- [1] *Telescope to Observe Planetary Systems (TOPS): a high throughput 1.2m visible telescope with a small inner working angle*, number 62 in 6265, May 2006.
- [2] *Fabrication and Characteristics of Free Standing Shaped Pupil Masks for TPF-Coronagraph*, number 130 in 6265, May 2006.
- [3] *Hybrid Pupil Mapping/Masking Systems for High-Contrast Imaging*, number 48 in 6265, May 2006.
- [4] *Wavelength dependence of aberrations in the near field: influence and compensation of Fresnel effects in coronagraphs*, number 51 in 6265, May 2006.
- [5] *Primary Mirror interrogation and correction for high-contrast imaging*, number 162 in 6265, May 2006.
- [6] *Wavefront amplitude and phase correction using pupil-shape diversity*, number 46 in 6272, May 2006.
- [7] L. Pueyo, M. G. Littman, J. Kasdin, R. Vanderbei, R. Belikov, and A. Give'on, editors. *Chromaticity effects in adaptive optics; wavelength dependence of amplitude compensation*, January 2005.
- [8] A. Give'on, N. J. Kasdin, R. J. Vanderbei, and Y. Avitzour. High-frequency folding and optimal phase conjugation for high-contrast adaptive optics. In *Advancements in Adaptive Optics. Edited by Domenico B. Calia, Brent L. Ellerbroek, and Roberto Ragazzoni. Proceedings of the SPIE, Volume 5490, pp. 1438-1449 (2004).*, pages 1438–1449, October 2004.
- [9] L. A. Pueyo, A. Give'on, M. G. Littman, N. J. Kasdin, and R. J. Vanderbei. High-dynamic-range imaging: amplitude and phase control. In *Advancements in Adaptive Optics. Edited by Domenico B. Calia, Brent L. Ellerbroek, and Roberto Ragazzoni. Proceedings of the SPIE, Volume 5490, pp. 545-553 (2004).*, pages 545–553, October 2004.
- [10] W. L. Simmons, W. C. Cash, S. Seager, E. Wilkinson, N. J. Kasdin, R. J. Vanderbei, N. Chow, E. Gralla, and J. Kleingeld. The New Worlds Observer: a mission for high-resolution spectroscopy of extra-solar

- terrestrial planets. In *Microwave and Terahertz Photonics*. Edited by Stohr, Andreas; Jager, Dieter; Iezekiel, Stavros. *Proceedings of the SPIE, Volume 5487*, pp. 1634-1645 (2004)., pages 1634–1645, October 2004.
- [11] J. J. Green, S. B. Shaklan, R. J. Vanderbei, and N. J. Kasdin. The sensitivity of shaped pupil coronagraphs to optical aberrations. In *Microwave and Terahertz Photonics*. Edited by Stohr, Andreas; Jager, Dieter; Iezekiel, Stavros. *Proceedings of the SPIE, Volume 5487*, pp. 1358-1367 (2004)., pages 1358–1367, October 2004.
- [12] N. J. Kasdin, R. J. Vanderbei, M. G. Littman, M. Carr, and D. N. Spergel. The shaped pupil coronagraph for planet finding coronagraphy: optimization, sensitivity, and laboratory testing. In *Microwave and Terahertz Photonics*. Edited by Stohr, Andreas; Jager, Dieter; Iezekiel, Stavros. *Proceedings of the SPIE, Volume 5487*, pp. 1312-1321 (2004)., pages 1312–1321, October 2004.
- [13] N. J. Kasdin, R. A. Brown, C. J. Burrows, S. Kilston, M. Kuchner, M. G. Littman, M. C. Noecker, S. Seager, D. N. Spergel, E. L. Turner, W. A. Traub, R. J. Vanderbei, and R. A. Woodruff. An optical/UV space coronagraph concept for the terrestrial planet finder. *Advances in Space Research*, 34:625–630, 2004.
- [14] A. Give'on, N. J. Kasdin, R. J. Vanderbei, D. N. Spergel, M. G. Littman, and P. Gurfil. Feasible optimal deformable mirror shaping algorithm for high-contrast imaging. In *Astronomical Adaptive Optics Systems and Applications*. Edited by Tyson, Robert K.; Lloyd-Hart, Michael. *Proceedings of the SPIE, Volume 5169*, pp. 288-297 (2003)., pages 288–297, December 2003.
- [15] A. Give'on, N. J. Kasdin, R. J. Vanderbei, D. N. Spergel, M. G. Littman, and P. Gurfil. Stochastic optimal phase retrieval algorithm for high-contrast imaging. In *Astronomical Adaptive Optics Systems and Applications*. Edited by Tyson, Robert K.; Lloyd-Hart, Michael. *Proceedings of the SPIE, Volume 5169*, pp. 276-287 (2003)., pages 276–287, December 2003.
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BOOK REVIEWS

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PATENTS

- [1] R.J. Vanderbei. Methods and apparatus for efficient resource allocation, May 1988. U.S. Patent Number 4,744,026. Extension of Karmarkar algorithm to handle linear programming problems with free variables.
- [2] R.J. Vanderbei. Methods and apparatus for efficient resource allocation, Dec 1989. U.S. Patent Number 4,885,686. Extension of Karmarkar algorithm to handle linear programming problems with dense columns.
- [3] B.A. Freedman, M.S. Meketon, and R.J. Vanderbei. Methods and apparatus for efficient resource allocation, May 1990. U.S. Patent Number 4,924,386. Extension of Karmarkar algorithm to handle linear programming problems with nonzero lower bounds and finite upper bounds.
- [4] P. Schwander, L.A. Shepp, and R.J. Vanderbei. Apparatus and method for tomography of microscopic samples, August 1997. U.S. Patent Number 5,659,175. Invention concerns microscopic tomography, wherein probabilities of occupancy of individual lattice sites within a crystal are estimated. Application to the examination of the internal structure of semiconductors.

ON-LINE EDUCATIONAL RESOURCES

<http://campuscgi.princeton.edu/~rvdb/JAVA/pivot/simple.html> and <http://campuscgi.princeton.edu/~rvdb/JAVA/network/nettool/netsimp.html>. Pivot tools for teaching linear programming.

<http://www.sor.princeton.edu/~rvdb/sail/sail.html>. A case study using sailing as a metaphor for the stochastic optimization.

<http://www.princeton.edu/~rvdb/JAVA/astro/galaxy/nBody.html>. A collection of Java applets illustrating interesting solutions to the n-body problem. Several are obtained as the solution to an optimization problem.

<http://www.princeton.edu/~rvdb/JAVA/sudoku/Sudoku.html> A Java applet that solves Sudoku problems.

<http://www.princeton.edu/~rvdb/floyd.html> A case study illustrating how optimization is used to design FIR filters.

http://www.princeton.edu/~rvdb/JAVA/twophase_animate/index.html, http://www.princeton.edu/~rvdb/JAVA/pd_animate2/index.html, and http://www.princeton.edu/~rvdb/JAVA/affine_animate2/index.html are a trio of applets illustrating linear programming algorithms in the context of solving the minimum weight structural design problem.

DEVELOPMENT EXPERIENCE

Lead architect and developer of AT&T's commercial implementation of the affine-scaling algorithm for linear programming.

Developed LOQO, a software package for general nonlinear optimization.

OUTSIDE ACTIVITIES

Soaring. Chief Flight Instructor, Central Jersey Soaring Club, 1987-1996.

Skiing. National Ski Patrol, 1972-1974.

GRADUATE STUDENTS ADVISED

Antonio Duarte, Ph.D., 1994, *A new computational approach for primal-dual interior point algorithm*, Invest. Mgmt. Banking, Banco do Bahia Investimos, Rio de Janeiro, Brazil.

Bing Yang, matriculated 1992.

Jianhua Yuan, matriculated 1994.

Hande Benson, Ph.D., 2001.

Arun Sen, Ph.D., 2005.

COURSES TAUGHT

Calculus II	MATH 130
Probability	MATH 361
Probability and Statistics	MATH 363
Applied Stochastic Processes	MATH 461
Computer Methods for Problem Solving	ORF 201
Deterministic Systems Analysis	ORF 307
Stochastic Systems Analysis	CIV 308
Real Analysis for Engineers	CIV 506
Linear Programming	ORF 522
Nonlinear Programming	ORF 523
Stochastic Processes	ORF 515
Convex Analysis	ORF 569

COURSE EVALUATIONS

Course	Semester	Year	Enrollment	Evaluation
ORF 201	Spring	2000	82	3.5
ORF 201	Spring	2001	64	4.2
ORF 307	Spring	2002	54	4.0
ORF 307	Spring	2003	67	4.0
ORF 307	Spring	2004	80	4.2
ORF 522	Fall	2001	23	4.4
ORF 522	Fall	2002	23	4.0
ORF 522	Fall	2003	8	4.4
ORF 522	Fall	2004	18	4.3
ORF 522	Fall	2005	18	4.2
ORF 522	Fall	2006	16	4.4
ORF 522	Fall	2007	26	4.4
ORF 523	Spring	2000	13	4.3