

ROBERT J. VANDERBEI

Operations Research and
Financial Engineering
Princeton University



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EDUCATION

Cornell University

Ph.D. in Applied Mathematics 1981
Dissertation Title: "Toward a Stochastic Calculus for Several Markov Processes"
Advisor: E.B. Dynkin *Thesis Committee:* F. Spitzer, H.M. Taylor
M.S. in Applied Mathematics 1979

Rensselaer Polytechnic Institute

M.S. in Operations Research and Statistics 1978
B.S. in Chemistry 1976

EMPLOYMENT/POSITIONS

Princeton University

Department Chair, Operations Research and Financial Engineering 2005 – 2012
Professor, Operations Research and Financial Engineering (formerly CEOR) 1999 –
Affiliated Member
Departments: Mechanical and Aerospace Engineering 2011 –
Astrophysics 2006 –
Mathematics 2003 –
Computer Science 2000 –
Program in Applied and Computational Mathematics 1994 –
Associate Professor, Civil Engineering and Operations Research 1990 – 1996

AT&T Bell Laboratories

Member of Technical Staff, Mathematics Research Center 1984 – 1991

University of Illinois at Urbana-Champaign

Visiting Lecturer, Mathematics 1982 – 1984

Courant Institute of Mathematical Sciences at NYU

NSF Postdoctoral Research Fellow, Mathematics 1981 – 1982

HONORS

Khachiyan Prize INFORMS Optimization Society 2017
Fellow American Mathematical Society (AMS) 2014–
Fellow Society for Industrial and Applied Mathematics (SIAM) 2012–
Fellow Institute for Ops. Res. and Mgmt. Sciences (INFORMS) 2006–

SELECTED PLENARY ADDRESSES

Numerical Optimization Applied to Space-Related Problems, **Distinguished Alumni Colloquium**, Cornell University, November 2016.

Fast Fourier Optimization, **Optimization Days**, GERAD, Montreal CA, May 2013.

Linear Optimization, **Machine-Learning Summer School**, LaPalma Canary Islands, April 2012.

Extreme Optics and the Search for Earth-Like Planets, **ISMP**, Rio de Janeiro, August 2006.

Nonlinear Programming and Engineering Applications (tutorial), **INFORMS**, Denver, Oct. 2004.

GRANTS

Office of Naval Research (1997–2008, 2013–2019) *Fast Fourier Optimization with Application to Antenna Array Control and High-Contrast Imaging*, principal investigator

NASA (2001–2006, 2004–2005, 2010–2012) *Concept Study of Pupil Mapping for High-Contrast Imaging*, principal investigator

National Science Foundation. (1995–2004) *Interior Point Methods for Large Scale Nonlinear Programming*, principal investigator

Co-investigator on several other grants

PROFESSIONAL ACTIVITIES INCLUDING EDITORIAL POSITIONS

Associate Editor, <i>Optimization in Engineering</i>	2014–
Associate Editor, <i>Mathematical Programming</i>	2003–2005
Associate Editor, <i>Optimization in Engineering</i>	2001–2005
Associate Editor, <i>INFORMS Journal on Computing</i>	1991–2001
Beale-Orchard Hayes Award Committee, Member/Chair	1993–1997
Editorial Board, <i>Optimization Methods and Software</i>	2014–
Editorial Board, <i>Foundations and Trends in Optimization</i>	2012–
Editorial Advisory Board, <i>Mathematical Programming Computation</i>	2008–
INFORMS Subdivisions Council, Member	2010–2012
INFORMS Sections and Societies Committee, Member	2010–2012
INFORMS Computing Society, Chair-Elect/Chair	2008–2011
INFORMS Expository Writing Award Committee, Member/Chair	2001–2003
INFORMS Optimization Section, Chair	1999–2001
INFORMS Optimization Section Prize Committee, Chair	1999–2000
SIAG-OPT Optimization Prize Committee, Chair	2005, 2008
SIAG-OPT, Vice-Chair	2004–2008

BOOKS

1. E.Çınlar and R.J. Vanderbei. *Real and Convex Analysis*. Springer-Verlag, 2013.
2. J.R. Gott and R.J. Vanderbei. *Sizing Up The Universe: The Cosmos In Perspective*. National Geographic, 2010.
3. R.J. Vanderbei. *Linear Programming: Foundations and Extensions*. Springer (formerly Kluwer), (1st edition) 1997, (paperback) 1998, (2nd edition) 2001, (3rd edition) 2007, (4th edition) 2013.

SELECTED JOURNAL PUBLICATIONS

(OUT OF 188 TOTAL)

1. R.J. Vanderbei. Sparsity matters. *INFORMS OS Today*, 8(1):10–16, 2018.
2. R.J. Vanderbei. The falling slinky. *American Mathematical Monthly*, 124(1):24–36, 2017.
3. B. Rudloff, F. Ulus, and R.J. Vanderbei. A parametric simplex algorithm for linear vector optimization problems. *Mathematical Programming, Series A*, 163(1):213–242, 2017.
4. R.J. Vanderbei, Kevin Lin, Han Liu, and Lie Wang. Revisiting Compressed Sensing: Exploiting the Efficiency of Simplex and Sparsification Methods. *Math. Prog. C*, 8:253–269, 2016.
5. Haotian Pang, Han Liu, and R.J. Vanderbei. The fastclime Package for Linear Programming and Large-Scale Precision Matrix Estimation in R. *JMLR*, 15(1):489–493, 2014.
6. R.J. Vanderbei, G. Scharf, and D. Marlow. A Regression Approach to Fairer Grading. *SIAM Review*, 56(2):337–352, 2014.
7. R. J. Vanderbei. Fast Fourier optimization. *Math. Prog. Comp.*, 4(1):53–69, 2012.
8. R.J. Vanderbei. Local Warming. *SIAM Review*, 54(3):597–606, 2012.
9. R.J. Vanderbei and M.Ç. Pinar. Pricing American Perpetual Warrants by Linear Programming. *SIAM Review*, 51:767–782, 2009.
10. R.J. Vanderbei. Extreme Optics and the Search for Earth-Like Planets. *Mathematical Programming Series B*, 112(1):255–272, 2008.
11. R.J. Vanderbei, E. Cady, and N.J. Kasdin. Optimal occulter design for finding extrasolar planets. *Astrophysical Journal*, 665(1):794–798, 2007.
12. N.J. Kasdin, R.J. Vanderbei, and R. Belikov. Shaped pupil coronagraphy. *C.R. Physique*, 8:312–322, 2007.
13. R.J. Vanderbei and E. Kolemen. Linear Stability of Ring Systems. *Astronomical Journal*, 133(2):656–664, 2007.
14. 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.
15. R. Belikov, N.J. Kasdin, and R.J. Vanderbei. Diffraction-Based Sensitivity Analysis of Apodized Pupil Mapping Systems. *Astrophysical Journal*, 652:833, 2006.
16. R.J. Vanderbei. Diffraction Analysis of 2-D Pupil Mapping for High-Contrast Imaging. *Astrophysical Journal*, 636:528, 2006.
17. R.J. Vanderbei and W.A. Traub. Pupil Mapping in 2-D for High-Contrast Imaging. *Astrophysical Journal*, 626:1079–1090, 2005.
18. R. J. Vanderbei, N. J. Kasdin, and D. N. Spergel. Checkerboard-Mask Coronagraphs for High-Contrast Imaging. *Astrophysical Journal*, 615(1):555, 2004.
19. 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.
20. W.A. Traub and R.J. Vanderbei. Two-Mirror Apodization for High-Contrast Imaging. *Astrophysical Journal*, 599:695–701, 2003.

21. R.J. Vanderbei, D.N. Spergel, and N.J. Kasdin. Circularly Symmetric Apodization via Star-shaped Masks. *Astrophysical Journal*, 599:686–694, 2003.
22. R.J. Vanderbei, D.N. Spergel, and N.J. Kasdin. Spiderweb Masks for High Contrast Imaging. *Astrophysical Journal*, 590:593–603, 2003.
23. A. Ruszczyński and R.J. Vanderbei. Frontiers of Stochastically Nondominated Portfolios. *Econometrica*, 71(4):1287–1297, 2003.
24. 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.
25. 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.
26. 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.
27. M. Muramatsu and R.J. Vanderbei. Primal-Dual Affine-Scaling Algorithms Fail for Semidefinite Programming. *Mathematics of Operations Research*, 24(1):149–175, 1999.
28. A. Kagan, C. Mallows, L.A. Shepp, R.J. Vanderbei, and Y. Vardi. Symmetrization of Binary Random Variables. *Bernoulli*, 5(6):1013–1020, 1999.
29. 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.
30. J.M. Mulvey, R.J. Vanderbei, and S.A. Zenios. Robust optimization of large scale systems. *Operations Research*, 43(2):264–281, 1995.
31. R.J. Vanderbei. A probabilistic formula for the concave hull of a function. *Ann. Prob.*, 23:2014–2021, 1995.
32. L.A. Shepp and R.J. Vanderbei. The complex zeros of random polynomials. *Transactions of the AMS*, 347(11):4365–4384, 1995.
33. R.J. Vanderbei and B. Yang. The simplest semidefinite programs are trivial. *Math. of OR*, 20:590–596, 1995.
34. R.J. Vanderbei. Affine-scaling trajectories associated with a semi-infinite linear program. *Math. of OR*, 20:163–174, 1995.
35. R.J. Vanderbei. Symmetric quasi-definite matrices. *SIAM Journal on Optimization*, 5(1):100–113, 1995.
36. R.J. Vanderbei. Interior-point methods: algorithms and formulations. *ORSA J. on Computing*, 6:32–34, 1994.
37. R.J. Vanderbei and T.J. Carpenter. Symmetric indefinite systems for interior-point methods. *Mathematical Programming*, 58:1–32, 1993.
38. R.J. Vanderbei. ALPO: Another linear program optimizer. *ORSA J. on Computing*, 5:134–146, 1993.
39. R.J. Vanderbei. Optimal switching among several Brownian motions. *SIAM Journal on Control and Optimization*, 30:1150–1162, 1992.
40. A. Mandelbaum, L.A. Shepp, and R.J. Vanderbei. Optimal switching between a pair of Brownian motions. *Ann. Prob.*, 18:1010–1033, 1990.
41. R.J. Vanderbei. Affine scaling for linear programs with free variables. *Mathematical Programming*, 43:31–44, 1989.
42. R.J. Vanderbei, M.S. Meketon, and B.F. Freedman. A modification of Karmarkar’s linear programming algorithm. *Algorithmica*, 1:395–407, 1986.
43. R.J. Vanderbei. Probabilistic solution of the Dirichlet problem for biharmonic functions in discrete space. *Ann. Prob.*, 12:311–324, 1984.
44. E.B. Dynkin and R.J. Vanderbei. Stochastic waves. *Transactions of the AMS*, 275:771–779, 1983.

45. R.J. Vanderbei. Toward a stochastic calculus for several Markov processes. *Adv. Appl. Math.*, 4:125–144, 1983.
46. 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.
47. A. Mandelbaum and R.J. Vanderbei. Optimal stopping and supermartingales over partially ordered sets. *Z. Warsch. verw. Gebiete*, 57:253–264, 1981.
48. R.J. Vanderbei. Optimal choice of a subset of a population. *Math. OR*, 5:481–486, 1980.