

# John E. Mitchell

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## Employment

- July 2003 – Rensselaer Polytechnic Institute, Troy, NY  
Professor of Mathematical Sciences  
Professor of Industrial and Systems Engineering  
(Decision Sciences and Engineering Systems prior to 2010)
- July 1994 – June 2003 Rensselaer Polytechnic Institute, Troy, NY  
Associate Professor of Mathematical Sciences  
Associate Professor of Decision Sciences and Engineering Systems
- August 1988 – July 1994 Rensselaer Polytechnic Institute, Troy, NY  
Assistant Professor of Mathematical Sciences  
Assistant Professor of Decision Sciences and Engineering Systems
- January – June 2005 McMaster University, Hamilton, Ontario.  
Visiting Professor
- Aug 1997 – July 1998 Delft University of Technology, The Netherlands.  
Visiting Professor

## Education

- Ph.D. Operations Research, Cornell University, Ithaca, N.Y. August 1988  
Thesis: *Karmarkar's algorithm and combinatorial optimization problems*  
Advisor: Michael J. Todd
- M.S. Operations Research, Cornell University, Ithaca, N.Y. September 1986
- B.A. Honours Mathematics, Cambridge University, England, June 1983

## Publications

Google Scholar page: <http://scholar.google.com/citations?user=BQGw7AUAAAAAJ&hl=en>  
h-index: 26.

## Invited survey chapters (lightly refereed)

1. "Interior Point Algorithms for Integer Programming", Chapter 6, pp. 223-248, in "Advances in Linear and Integer Programming", edited by J. Beasley, Oxford University Press, 1996.
2. "Interior Point Methods for Combinatorial Optimization", Chapter 11, pp. 417-466, in "Interior Point Methods in Mathematical Programming", edited by T. Terlaky, Kluwer Academic Publishers, 1996.
3. "Interior Point Methods for Combinatorial Optimization", with Panos Pardalos and Mauricio G. C. Resende. Pages 189-297 in the "Handbook of Combinatorial Optimization", Volume 1, edited by D.-Z. Du and P. Pardalos, Kluwer Academic Publishers, 1998.

4. “Branch-and-Cut Algorithms for Integer Programming”, in the “Encyclopedia of Optimization”, edited by C. Floudas and P. Pardalos, Springer, June 2001.
5. “Cutting Plane Algorithms for Integer Programming”, in the “Encyclopedia of Optimization”, edited by C. Floudas and P. Pardalos, Springer, June 2001.
6. “Branch-and-bound methods for integer programming”, with Eva K. Lee, in the “Encyclopedia of Optimization”, edited by C. Floudas and P. Pardalos, Springer, June 2001.
7. “Branch-and-cut methods for combinatorial optimization problems”, pages 65-77 in the “Handbook of Applied Optimization”, edited by P. Pardalos and M. G. C. Resende, Oxford University Press, January 2002.
8. “Interior point methods for large scale linear programming”, with Kris Farwell and Daryn Ramsden, in the “Handbook of Optimization in Telecommunications”, Chapter 1, pages 3–25, edited by P. Pardalos and M. G. C. Resende, Springer, February 2006.
9. “Cutting plane methods and subgradient methods”, INFORMS TutORials, Chapter 2, pages 34–61, edited by M. Oskoorouchi, October 2009.
10. “Network Flow Approaches for Analyzing and Managing Disruptions to Interdependent Infrastructure Systems”, with E. E. Lee and W. A. Wallace. In the “Wiley Handbook of Science and Technology for Homeland Security”, edited by John G. Voeller, Volume 2. John Wiley & Sons, Inc, Hoboken, NJ. 2009, pp 1419-1428. (Also accessible at <http://mrw.interscience.wiley.com/emrw/9780470087923/hhs/article/hhs686/current/abstract>)
11. “Branch and Cut”. In the “Wiley Encyclopedia of Operations Research and Management Science”, February 2011.
12. “Urban freight tour models: state of the art and practice”, with José Holguin-Veras, Ellen Thorson, Qian Wang, Ning Xu, Carlos Gonzalez-Calderon, and Ivan Sanchez-Diaz. In “Freight Transport Modelling”, edited by Moshe Ben-Akiva, Hilde Meersman and Eddy Van de Voorde, Emerald Group Publishing, Chapter 17, 2013.

**Contributions to edited compilations of original research (refereed to journal standards)**

13. “On the Relationship Between the Search Directions in the Affine and Projective Variants of Karmarkar’s Linear Programming Algorithm,” (with M. J. Todd), Contributions to Operations Research and Econometrics: The Twentieth Anniversary of CORE, edited by Bernard Cornet and Henry Tulkens, MIT Press, Cambridge, pp. 237-250, 1990.
14. “Solving perfect matching problems using Karmarkar’s algorithm,” (with M. J. Todd), in Mathematical Developments Arising from Linear Programming; (J. Lagarias and M. J. Todd, editors), (Contemporary Mathematics, Volume 114), American Mathematical Society, pp. 309-318, 1991.
15. “Solving MAXSAT problems using branch-and-cut”, (with Steve Joy and Brian Borchers), Satisfiability Problem: Theory and Applications, AMS/DIMACS Series in Discrete Mathematics and Applications, Volume 35, pp. 519-536, 1997.

16. “Computational experience of an interior-point SQP algorithm in a parallel branch-and-bound framework”, (with E. K. Lee), Chapter 13, pages 329-347, “High Performance Optimization”, edited by H. L. Frenk et al., Kluwer Academic Publishers, 2000.
17. “Solving linear ordering problems with a combined interior point/simplex cutting plane algorithm”, (with Brian Borchers), Chapter 14, pages 349-366, “High Performance Optimization”, edited by H. L. Frenk et al., Kluwer Academic Publishers, 2000.
18. “A homogenized cutting plane method to solve the convex feasibility problem”, (with Erling Andersen, Kees Roos, and Tamas Terlaky). Chapter 10 in “Optimization Methods and Applications”, edited by X. Q. Yang et al, Kluwer Academic Publishers, April 2001.
19. “Semi-infinite linear programming approaches to semidefinite programming problems”, (with Kartik Krishnan), Fields Institute Communications, volume 37, edited by P. Pardalos and H. Wolkowicz, pages 123–142, 2003.
20. “Managing Disruptions to Critical Infrastructure Interdependencies in the Context of the 2001 World Trade Center Attack”, (with W.A. Wallace, D. Mendonça, E. Lee, and J. Chow), in “Beyond September 11: An account of post-disaster research”, edited by M. F. Myers, Natural Hazards Research and Applications Information Center, University of Colorado, Program on Environment and Behavior, Special Publication #39, pages 165-198, 2003.
21. “Logic-based multi-objective optimization for restoration planning”, with J. Gong, E. E. Lee, and W. A. Wallace, Chapter 11 in “Optimization and Logistics Challenges in the Enterprise”, Springer, New York. W. Chaovalitwongse, K.C. Furman, and P.M. Pardalos (Eds). 2009.
22. “Obtaining tighter relaxations of mathematical programs with complementarity constraints”, with Jong-Shi Pang and Bin Yu. Chapter 1 in Springer Proceedings in Mathematics and Statistics, Volume 21, August 2012.

## Journal Articles

### Published:

23. “A variant of Karmarkar’s linear programming algorithm for problems with some unrestricted variables”, (with M. J. Todd), SIAM Journal on Matrix Analysis and Applications, Vol. 10(1), pp. 30-38, 1989.
24. “Solving combinatorial optimization problems using Karmarkar’s algorithm”, (with M. J. Todd), Mathematical Programming, Vol. 56(3), pp. 245-284, 1992.
25. “A primal-dual interior point cutting plane method for the linear ordering problem”, (with B. Borchers), the COAL Bulletin, Vol. 21, pp. 13-18, November 1992.
26. “Updating lower bounds when using Karmarkar’s projective algorithm for linear programming”, Journal of Optimization Theory and Applications, Vol. 78, pp. 127-142, July 1993.
27. “An improved branch and bound algorithm for mixed integer nonlinear programming”, (with B. Borchers), Computers and Operations Research, Vol. 21 (4), pp. 359-367, 1994.

28. "An interior point column generation method for linear programming using shifted barriers", *SIAM Journal on Optimization*, Vol. 4 (2), pp. 423-440, May 1994.
29. "Analyzing and Exploiting the Structure of the Constraints in the ILP Approach to the Scheduling Problem", (with S. Chaudhuri and R. A. Walker), *IEEE Transactions on VLSI*, Vol. 2 (4), pp. 456-471, December 1994.
30. "An Alternative Derivation of the Projective Interior Point Method for Linear Programming through the Least Squares Approach", (with Z.-Y. Cheng), *Optimization*, Vol. 31, pp. 95 - 106, 1994.
31. "Nonlinear effects of teaching and consulting on academic research productivity", (with D. S. Rebne), *Socio-Economic Planning Sciences*, Vol. 29, pp. 47-57, 1995.
32. "A Primal-Dual Interior Point Method for Linear Programming based on a Weighted Barrier Function", (with Z.-Y. Cheng), *Journal of Optimization Theory and Applications*, Vol. 87, pp. 301-321, 1995.
33. "Solving real-world linear ordering problems using a primal-dual interior point cutting plane method", (with B. Borchers), *Annals of OR*, Vol. 62, pp. 253-276, 1996.
34. "Fixing Variables and Generating Classical Cutting Planes when using an Interior Point Branch and Cut Method to solve Integer Programming Problems", *European Journal of Operational Research*, Vol. 97, pp. 139-148, 1997.
35. "A Computational Comparison of Branch and Bound and Outer Approximation Methods for 0-1 MINLPs", (with Brian Borchers), *Computers and Operations Research*, Vol. 24, pp. 699-701, 1997.
36. "Computational experience with an interior point cutting plane algorithm", *SIAM Journal of Optimization*, 10(4), pages 1212-1227, 2000.
37. "Stratified filtered sampling in stochastic optimization", (with John Mulvey, Bob Rush and Tom Willemain), *Journal of Applied Mathematics and Decision Sciences*, 4(1), pages 17-38, 2000.
38. "A long step cutting plane algorithm for linear and convex programming", (with S. Ramaswamy), *Annals of OR*, Vol 99, pages 95-122, 2000.
39. "An ellipsoid algorithm for equality-constrained nonlinear programs", (with Sharmila Shah and Mike Kupferschmid), *Computers and Operations Research*, Vol 28(1), pages 85-92, 2001.
40. "Restarting after branching in the SDP approach to MAX-CUT and similar combinatorial optimization problems", *Journal of Combinatorial Optimization*, Vol 5(2), pages 151-166, 2001.
41. "Realignment in the NFL", *Naval Research Logistics*, 50(7), pages 683-701, 2003.
42. "Polynomial interior point cutting plane algorithms", *Optimization Methods and Software*, 18(5), pages 507-534, 2003.

43. “Using selective orthonormalization to update the analytic center after the addition of multiple cuts”, (with Srini Ramaswamy), *Journal of Optimization Theory and Applications*, 125(2), pages 431–451, 2005.
44. “A semidefinite programming heuristic for quadratic programming problems with orthogonality constraints”, (with Steve Braun). *Computational Optimization and Applications*, 31(1), pages 5–29, 2005.
45. “Finding optimal realignments in sports leagues using a branch-and-cut-and-price approach”, with Xiaoyun Ji. *International Journal of Operational Research*, 1(1–2), pages 101–122, 2005.
46. “A unifying framework for several cutting plane methods for semidefinite programming”, (with Kartik Krishnan). *Optimization Methods and Software*, 21(1), pages 57–74, February 2006.
47. “A semidefinite programming based polyhedral cut and price approach for the maxcut problem”, (with Kartik Krishnan). *Computational Optimization and Applications*, 33(1), pages 51–71, 2006.
48. “Branch-and-Price-and-Cut on the Clique Partition Problem with Minimum Clique Size Requirement”, with Xiaoyun Ji. *Discrete Optimization* 4(1), pages 87–102, 2007.
49. “Restoration of Services in Interdependent Infrastructure Systems: A Network Flows Approach”, with E. E. Lee and W. A. Wallace. *IEEE Transactions on Systems, Man, and Cybernetics–Part C: Applications and Reviews* 37(6), pages 1303–1317, 2007.
50. “Optimal placement of stereo sensors”, with M. Al Hasan and K. K. Ramachandran, *Optimization Letters* 2(1), pages 99–111, 2008.
51. “Selective Gram-Schmidt orthonormalization for conic cutting plane algorithms”, with V. L. Basescu, *Mathematical Methods of Operations Research* 67(1), pages 91–115, 2008.
52. “Proximity queries between convex objects: an interior point approach for implicit surfaces”, with S. Akella, N. Chakraborty, and J. Peng, *IEEE Transactions on Robotics* 24(1), pages 211–220, 2008.
53. “On the global solution of linear programs with linear complementarity constraints”, J. Hu, J. E. Mitchell, J.-S. Pang, K. P. Bennett, and G. Kunapuli, *SIAM Journal on Optimization* 19(1), pages 445–471, 2008.
54. “An analytic center cutting plane approach for conic programming”, with V. L. Basescu, *Mathematics of Operations Research* 33(3), pages 529–551, 2008.
55. “A second-order cone cutting surface method: complexity and application”, with M. Oskorouchi, *Computational Optimization and Applications* 43(3), pages 379–409, 2009.
56. “An LPCC approach to nonconvex quadratic programs”, (with Jing Hu and Jong-Shi Pang). *Mathematical Programming*, 133(1-2), pages 243–277, 2012.
57. “On linear programs with linear complementarity constraints”, (with Jing Hu, Jong-Shi Pang, and Bin Yu), *Journal of Global Optimization*, 53(1), pages 29–51, 2012.

58. “Properties of a cutting plane method for semidefinite programming”, (with Kartik Krishnan Sivaramakrishnan), *Pacific Journal of Optimization*, Volume 8(4), pages 779-802, 2012.
59. “Restoring Infrastructure Systems: An Integrated Network Design and Scheduling Problem”, with Sarah G. Nurre, Burak Cavdaroglu, Thomas C. Sharkey, and William A. Wallace. *European Journal of Operational Research*, Volume 223(3), pages 794-806, 16 December 2012.
60. “Integrating restoration and scheduling decisions for disrupted interdependent infrastructure systems” (with Burak Cavdaroglu, Erik Hammel, Thomas C. Sharkey, and William A. Wallace). *Annals of Operations Research*, 203(1), pages 279–294, March 2013.
61. “On convex quadratic programs with linear complementarity constraints”, with Lijie Bai and Jong-Shi Pang. *Computational Optimization and Applications*, 54(3), pages 517–554, April 2013.
62. “Rebalancing an investment portfolio in the presence of convex transaction costs and market impact costs” (with Steve Braun). *Optimization Methods and Software*, 28(3), pages 523–542, 2013.
63. “P-hub approach for the optimal park-and-ride facility location problem”, with Felipe Aros and Vladimir Marianov. *European Journal of Operational Research*, 226(2), pages 277–285, April 2013.
64. “A globally convergent probability-one homotopy for linear programs with linear complementarity constraints”, with Layne T. Watson, Stephen C. Billups, and David R. Easterling. *SIAM Journal on Optimization*, 23(2), pages 1167–1188, 2013.
65. “Convex quadratic relaxations of nonconvex quadratically constrained quadratic programs”, with Jong-Shi Pang and Bin Yu. *Optimization Methods and Software*, 29(1), pages 120–136, 2014.
66. “An interdependent layered network model for a resilient supply chain”, with Jing Gong, Ananth Krishnamurthy and W. A. Wallace. *Omega*, 46, pages 104–116, 2014.
67. “Using quadratic convex reformulation to tighten the convex relaxation of a quadratic program with complementarity constraints”, with Lijie Bai and Jong-Shi Pang. *Optimization Letters*, 8(3), pages 811–822, 2014.

**Accepted:**

68. “An algorithm for global solution to bi-parametric linear complementarity constrained linear programs”, with Yu-Ching Lee and Jong-Shi Pang. *Journal of Global Optimization*, online first.
69. “Interdependent network restoration: modeling restoration interdependencies and evaluating the value of information-sharing”, with Thomas Sharkey, Burak Cavdaroglu, Huy Nguyen, Jonathan Holman, and W. A. Wallace. Accepted for publication in the *European Journal of Operational Research*.

70. “Increasing the Resiliency of Local Supply Chain Distribution Networks against Multiple Hazards”, with Sarah Nurre and Thomas Sharkey. September 8, 2013. Accepted for publication in *Supply Chain Management and Logistics: Innovative Strategies and Practical Solutions*, CRC Press, Taylor & Francis Group, edited by Zhe Liang *et al.*

**Submitted:**

71. “On QPCCs, QCQPs and completely positive programs”, with Lijie Bai and Jong-Shi Pang. Journal submission, January 2014. Revised October 2014.
72. “Identification and Classification of Restoration Interdependencies in the Wake of Hurricane Sandy”, with Thomas Sharkey, Sarah Nurre, Huy Nguyen, Joe H. Chow, and William A. Wallace. Journal submission, February 2014. Revised August 2014.
73. “Complementarity Formulations of  $\ell_0$ -norm Optimization Problems”, with Mingbin Feng, Jong-Shi Pang, Xin Shen, and Andreas Wächter. September 23, 2013. Journal submission.

**Conference proceedings**

74. “Nonlinear Decision Variables in Work Design: Faculty Roles and Research Productivity,” (with D. S. Rebne), Proceedings of the Decision Sciences Institute, San Diego, California, November 19-21, pp. 1426-1428, 1990.
75. “The structure of assignment, precedence, and resource constraints in the ILP approach to the scheduling problem,” (with S. Chaudhuri and R. A. Walker), Proceedings of the 1993 IEEE International Conference on Computer Design, pp. 25-29, 1993.
76. “Computational experience in nonlinear mixed integer programming”, (with E. K. Lee), Proceedings of Symposium on Operations Research, August 1996, Braunschweig, Germany, (refereed), Springer-Verlag, pages 95-100, 1997.
77. “Computational experience of an interior point algorithm in a parallel branch-and-cut framework”, (with E. K. Lee), Proceedings of the Eighth SIAM Conference on Parallel Processing for Scientific Computing (refereed), CD-ROM, 1997.
78. “An interior point cutting plane algorithm for Ising spin glass problems”, Proceedings of Symposium on Operations Research, September 1997, Jena, Germany (refereed), Springer-Verlag, pages 114-119, 1998.
79. “Assessing Vulnerability of Proposed Designs for Interdependent Infrastructure Systems”, (with E. Lee and W. A. Wallace), Published in the Proceedings of the Hawai’i International Conference on System Sciences, January 5–8, 2004, Big Island, Hawaii.
80. “Disruptions in Interdependent Infrastructure Systems”, (with E. Lee and W. A. Wallace), Proceedings of 2004 NSF Design, Service and Manufacturing Grantees and Research Conference Proceedings, Dallas, Texas, January 2004. (CD-ROM)
81. “An approach for solving the integrative freight management simulation”, (with Ellen Thorson and José Holguín-Veras), Proceedings of the XIII Panamerican Conference on Traffic and Transportation Engineering, Albany, NY, September 2004. (CD-ROM)

82. “Extreme Events and the Sustainability of Civil Infrastructure Systems”, (with E. E. Lee and W. A. Wallace), Proceedings of the International Workshop on Integrated Life-Cycle Management of Infrastructures, The Hong Kong University of Science and Technology, Hong Kong SAR, PRC, December 2004.
83. “Decision technologies for protection of critical infrastructures”, (with Earl E. Lee, W. A. Wallace, and D. Mendonça). Proceedings of the 2005 Department of Homeland Security Science and Technology Directorate Conference - Working Together: R&D Partnerships in Homeland Security, Boston, MA, 2005.
84. “Proximity Queries between Convex Objects: An Interior Point Approach for Implicit Surfaces”, with S. Akella, N. Chakraborty, and J. Peng. Proceedings of ICRA2006, the 2006 IEEE International Conference on Robotics and Automation.
85. “Decomposition methods for restoring infrastructure systems” (with Burak Cavdaroglu, Erik Hammel, Thomas C. Sharkey, and William A. Wallace). Proceedings of ICVRAM, April 2011.
86. “Decision modeling for resilient infrastructures” (with Jing Gong and William A. Wallace). Proceedings of IEEE ISI 2011.

#### **Selected technical reports**

87. “Using an Interior Point Method in a branch and bound algorithm for integer programming”, (with B. Borchers), 1991.
88. “On Updating the Analytic Center after the Addition of Multiple Cuts”, (with Srinivasan Ramaswamy), 1994, revised 1998.
89. “A Long Step Cutting Plane Algorithm that uses the Volumetric Barrier”, (with Srinivasan Ramaswamy), 1995.
90. “Solving MAX-SAT and weighted MAX-SAT problems using branch-and-cut”, (with Steve Joy and Brian Borchers), February 1998.
91. “Branch-and-cut for the k-way equipartition problem”, January 2001.
92. “The clique partition problem with minimum clique size constraint”, with Xiaoyun Ji, May 2005.

#### **Book reviews**

1. Book review: “Linear Programming. 1: Introduction”, by G. B. Dantzig and M. N. Thapa (Springer), reviewed for *Optima*, Number 57, pp. 13-14, 1998.
2. Book review: “Single facility location problems with barriers”, by Kathrin Klamroth (Springer), reviewed for *SIAM Review*, Volume 45(4), pages 834–836, 2003.
3. Book review: “Integrated Methods for Optimization”, by John N. Hooker (Springer). *SIAM Review*, Volume 50(1), pages 183–185, 2008.



**Research Grants and Contracts** (Approximately \$4.2 million in external funding. Also co-investigator on several grants.)

1. “Using Interior Point Methods in a Cutting Plane Approach for Solving Integer Programming Problems,” June 1, 1990 - September 30, 1992; ONR; \$120,000.
2. “Graduate Traineeship,” May 15, 1993 - May 14, 1996, \$78,000, General Electric, for support of research and doctoral student, A. Hejna.
3. “Using Column Generation and Cutting Plane Methods to Solve Problems in Computational Logic,” February 1, 1994 - January 31, 1997, ONR, \$324,139.
4. “Graduate Traineeship”. December 15, 1994 - August 15, 1995. \$22,500, General Electric, for support of research and doctoral student, J. Bogart.
5. “Research Fellowship”, September 1, 1997 - August 15, 1998. \$20,000, NWO (Dutch Scientific Foundation), for sabbatical support.
6. “Mathematical Sciences Computing Research Environments”, co-Principal Investigator with M. Holmes, K. Bennett, D. Isaacson, D. Schwendeman, and T. Yu, July 1998 – July 2001, NSF/DMS equipment grant, \$93,000.
7. “Semidefinite Programming and Interior Point Cutting Plane Approaches to Integer Programming Problems”, September 1, 1999 – August 31, 2003, NSF/CCR, \$247,366.
8. “Disruptions in Interdependent Infrastructures”, co-Principal Investigator with W. A. Wallace, November 15, 2002 – November 15, 2003, NSF/DMII, exploratory, award number DMI 0228402, \$93,303.
9. “Decision Technologies for Managing Critical Infrastructure Interdependencies”, co-Principal Investigator with W. A. Wallace, August 15, 2003 – February 15, 2006, NSF/Civil Award number CMS 0301661, \$414,742.
10. “Polyhedral and non-polyhedral cutting plane methods: theory, algorithms, and applications”, September 1, 2003 – August 31, 2006, NSF/DMS Award number DMS 0317323, \$224,945.
11. “International Conference of Continuous Optimization: Rensselaer Polytechnic Institute, August 2-4, 2004”, co-PI with J.-S. Pang and K. P. Bennett. NSF/DMII Award number 0412377, \$30,000.
12. “Scientific Computing Research Environments for the Mathematical Sciences”, with D. Schwendeman, E. Giladi, and M. Holmes. NSF/DMS, September 2005 – September 2007, \$100,000.
13. “Cutting planes and surfaces, and conic programming”, September 1, 2007 – August 31, 2011, NSF/DMS Award Number DMS 0715446, \$259,999.
14. “Global Resolution of Convex Programs with Complementarity Constraints”, February 1, 2008 – November 30, 2010, The Optimization and Discrete Mathematics Program, The Directorate of Mathematics, Information, and Life Sciences, Air Force Office of Scientific Research. Joint with Professor Jong-Shi Pang of the University of Illinois, Urbana-Champaign. RPI portion: \$249,962

15. “Optimization techniques for locomotive scheduling”. August 15 – December 31, 2008. BNSF Railway. Fully supported a graduate student for one semester. \$25,450.
16. “Further Developments in the Global Resolution of Convex Programs with Complementarity Constraints”. (Collaborative research with Jong-Shi Pang.) AFOSR, September 1, 2011 – August 31, 2014. RPI portion: \$297,101.
17. “Collaborative CDI-Type II: Cyber Enabled Discovery System for Advanced Multidisciplinary Study of Humanitarian Logistics for Disaster Response”. PI: J. Holguin-Veras. Co-PI: S. Das, M. Magdon-Ismail, J. E. Mitchell, T. Wachtendorf (Delaware). NSF-IIS 1124827, January 2012 – December 2015. RPI portion: \$1,512,299.
18. “RAPID: Identifying and Modeling the Interdependencies of Restoration Efforts across Infrastructures”. PI: T. Sharkey. Co-PI: J. Chow, J. E. Mitchell, W. A. Wallace. NSF-IMEE, February 2013 – January 2014. \$31,500.
19. “Collaborative Research: Binary Constrained Convex Quadratic Programs with Complementarity Constraints and Extensions”. (Collaborative research with Jong-Shi Pang of USC and Andreas Wächter of Northwestern University.) NSF-CMMI, August 15, 2013 – July 31, 2016. \$150,000.

### **Doctoral Theses Supervised:**

Brian Borchers (Math), graduated August 1992, “Improved branch-and-bound algorithms for integer programming”. Won Joaquin B. Diaz prize (1992). First and current employer: New Mexico Tech (professor).

Zhao-Yang Cheng (Math), graduated August 1993, “A least squares approach to interior point methods with an application to geometric programming”. First employer: a financial company on Wall Street. Current employer: General Digital.

Srinivasan Ramaswamy (DSES), graduated December 1995, “Cutting plane algorithms for linear and convex programming”. First employer: United Airlines. Current employer: J.P. Morgan.

Bob Rush (DSES), graduated January 1998, “Decision-constrained stochastic programming for asset-liability management”. Current employer: Two Harbors Investment Corp.

Steve Braun (Math), graduated December 2001, “Solving a quadratic programming problem subject to orthogonality constraints”. First employer: Warren and Selbert.

Kartik Krishnan (Math), graduated August 2002, “Linear programming approaches to semidefinite programming problems”. First employer: Rice University (postdoc). Current employer: Axioma.

Vasile (Luc) Basescu (Math), graduated August 2003, “An analytic center cutting plane method in conic programming”. First employer: St Joseph College. Current employer: Campbell and Company.

Xiaoyun Ji (Math), graduated December 2004, “Graph partition problems with minimum size constraints”. Won Joaquin B. Diaz prize (2004). First employer: RPI (postdoc). Current employer: Verizon.

Kris Farwell (Math), graduated May 2006, “Gomory cutting plane algorithm using exact arithmetic”. First employer: Siena College (assistant professor). Current employer: Grace College.

Jinye Zhao (Math), graduated December 2007. Co-advised with Jong-Shi Pang. “Recent applications of Nash equilibria”. First and current employer: ISO – New England.

Chaoxiong Wang (Math), thesis defense November 2007, graduation May 2008. Co-advised with Jong-Shi Pang. “Power control for multiuser communication systems and computation of generalized Nash equilibria”. Current employer: PIMCO.

Jing Hu (Math), graduated August 2009. Co-advised with Jong-Shi Pang. “On linear programs with linear complementarity constraints”. First employer: AutoZone. Current employer: Marketing Analytics Inc.

Daryn Ramsden (Math), graduated December 2009. “Optimization approaches to sensor placement problems”. Current employer: Royal Bank of Scotland.

Bin Yu (DSES), graduated August 2011. “A branch and cut approach to linear programs with linear complementarity constraints”. Current employer: BNSF.

Erik Hammel (MATH), graduated May 2013. “Using reinforcement learning to improve network durability”. Current employer: RankMiner.

Tim Lee (MATH), graduated August 2013. “Approximations and improvements to semidefinite relaxations of optimization problems”. Current employer: Kisters North America.

Lijie Bai (MATH), graduated August 2013. “On convex quadratic programs with linear complementarity constraints”. Won Joaquin B. Diaz prize (2013). Current employer: Mathworks.

### **Doctoral Committee Member at RPI**

21 students in Mathematical Sciences, 31 students in DSES, 15 students in Computer Science, 6 students in Electrical and Systems Engineering, 2 students in Mechanical Engineering, 11 students in Civil Engineering, and 1 student in Chemical Engineering.

### **Doctoral Committee Member at other universities**

External doctoral committee member for students at the University of Waterloo and at the University of Edinburgh.

### **Editorship of Journals, refereeing, reviewing, and conference organization**

Editorial Board Member, International Journal of Operational Research, 2004–

Refereed approximately 120 papers.

Several undergraduate and graduate texts reviewed for publishers.

Multiple proposals reviewed for NSF and other funding agencies. Served on several NSF panels.

Multiple promotion and tenure evaluation letters written, as well as letters of recommendation for other faculty members.

Chair, local organizing committee, Mathematical Programming Society International Conference on Continuous Optimization (ICCOPT-I), held at RPI, July 31-August 4, 2004.

Member of the organizing committee for the MPE2013+ Natural Disasters Workshop.

### **Professional Societies**

*INFORMS / Operations Research Society of America:*

Member, 1984-1990. Full Member, 1990-present.

INFORMS Conferences: organized multiple sessions and streams, and chaired sessions.

Member of the INFORMS Computing Society Student Paper Award committee, September 2010.  
Elected vice-chair for Linear Programming and Complementarity, Optimization Society of INFORMS, 2013–15.

Stream Chair, Computational Optimization, INFORMS Computing Society Conference, Richmond, VA, 2015.

*Mathematical Programming Society:*

Member 1987 - present.

Mathematical Programming Symposia: organized multiple sessions and streams, and chaired sessions.

*SIAM:*

Member 1987 - present.

SIAM Conferences on Optimization: organized and chaired multiple sessions.

SIAM representative on organizing committee for ICCOPT-I, July 31 – August 4, 2004.

## **Service to University**

Advisor to Mathematical Sciences classes of 1997, 2003, 2009, and 2015.

Chair, Mathematical Sciences graduate committee, Fall 2011 – present.

Member, multiple institute and department committees.

Written letters of recommendation for approximately 50 undergraduate and 40 graduate students.

## **Professional and Public Lectures**

### **Selected Recent Invited Lectures**

1. J.E. Mitchell and T. Lee, “Using Column Generation to Improve the Sum of Squares Representation of a Polynomial Optimization Problem”, EURO/INFORMS 2013, 26th European Conference on Operational Research, Rome, Italy, July 1–4, 2013.
2. M. Feng, J.E. Mitchell, J.-S. Pang, X. Shen, and A. Wächter, “Reformulations of  $\ell_0$ -norm Problems: An Empirical Study”, INFORMS Annual Meeting, Minneapolis, October 6–9, 2013.
3. J.E. Mitchell, “Managing Interdependent Infrastructures in the Context of Disasters”, Rensselaer School of Science Dean’s Seminar Series, October 30, 2013.
4. J.E. Mitchell, “Finding Global Optima for Mathematical Programs with Complementarity Constraints”, Industrial Engineering and Management Science, Northwestern University, November 12, 2013.
5. J.E. Mitchell, M. Feng, J.-S. Pang, X. Shen, and A. Wächter, “Complementarity formulations for  $\ell_0$  optimization problems”, SIAM Conference on Optimization, San Diego, May 2014.
6. J.E. Mitchell, J.-S. Pang, and L. Bai, “On QPCCs, QCQPs, and completely positive programs”, International Conference on Complementarity Problems, Berlin, August 2014.

7. J.E. Mitchell, J.-S. Pang, and L. Bai, “On QPCCs, QCQPs, and completely positive programs”, INFORMS, San Francisco, November 2014.
8. E. Heath, J. E. Mitchell, and T. Sharkey, “Applying ranking and selection procedures to mitigation for improved infrastructure restoration”, INFORMS, San Francisco, November 2014.
9. A. Givler and J.E. Mitchell, “A stochastic CVaR approach to disaster relief planning”, INFORMS, San Francisco, November 2014.

## Honors and Awards

Obermann Fellowship, University of Iowa Center for Advanced Studies, August 1994.  
 Mathematical Sciences Institute Fellowship, 1986-1987  
 Cornell Graduate Fellowship, 1983-1986  
 Exhibition, Cambridge University, 1982-1983

## Courses Taught

### Graduate courses:

Nonlinear Programming.  
 Linear Programming.  
 Combinatorial Optimization and Integer Programming.  
 Stochastic Programming.

### Junior/Senior level courses:

Mathematical Models of Operations Research.  
 Linear Algebra.

### Freshman/Sophomore level courses:

Calculus II.  
 Multivariate Calculus and Matrix Algebra.  
 Introduction to Discrete Structures.  
 Art and Science of Mathematics.

## Other Activities

1. Online bibliography of optimization references: <http://www.rpi.edu/~mitchj/optim.bib>.  
 (Cited in “The Collection of Computer Science Bibliographies”, <http://liinwww.ira.uka.de/bibliography/Math/optim.html>.)
2. List of operations research web sites: [http://www.rpi.edu/~mitchj/sites\\_or.html](http://www.rpi.edu/~mitchj/sites_or.html)
3. Online datasets and generators for various problems: <http://www.rpi.edu/~mitchj/generators>
4. Consulted for various companies.