

Curriculum Vitae

James V. Burke

March, 2011

University of Washington
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EDUCATION AND APPOINTMENTS

Education

Ph.D., Mathematics, University of Illinois at Urbana-Champaign, October, 1983.
B.S., Mathematics, Knox College, Galesburg, Illinois, May 1977.

Appointments

University of Washington

97- : Full Professor, Mathematics
02- : Adjunct Professor, Statistics
00- : Adjunct Professor, Bioengineering
98- : Adjunct Professor, Applied Mathematics
06-10: Associate Director, Resource Facility for Population Kinetics, Bioengineering
00-10: Scientific Computing Team Lead, Resource Facility for Population Kinetics, Bioengineering
01-05: Director, Applied and Computational Mathematical Sciences Program
91-97: Associate Professor, Mathematics
85-91: Assistant Professor, Mathematics

University of Kentucky

83-85: Assistant Professor, Mathematics

Visiting

Spring 93: Argonne National Laboratories, Argonne, Illinois
Autumn 92: University of New South Wales, Sydney, Australia
Summer 90: Université de Pau et C.N.R.S., Pau, France
Summer 89: University of New South Wales, Sydney, Australia
Summer 85: Argonne National Laboratories, Argonne, Illinois

RESEARCH

Grant Support

National Institutes of Health

03-09: NIH/NIBIB 2 P41 EB01975 (PI Dr. Paolo Vicini) (03/01/2003 - 08/31/2009)
Resource Facility for Population Kinetics
Role: Investigator 30% salary support
Total Award: \$4.7 million
98-02: NIH/BRTP 1 P41 RR12609-02 (PI Dr.s David Foster and Paolo Vicini) (03/01/98 - 02/29/02)
Resource Facility for Population Kinetics
Role: Investigator 20% salary support
Total Award: \$4.7 million
96-97: NIH/BRTP 1 P41 (PI Dr. David Foster) (03/01/98 - 02/29/02)
Resource Facility for Kinetics Analysis
Role: Investigator 17% salary support
Total Award: \$4.5 million

National Science Foundation

05-09: NSF/DMS - 0505712 (PI Dr. James Burke) (06/07/05 - 12/31/07)
Variational analysis, optimization of eigenvalues, and robust stability
Role: Principal Investigator 17% salary support
Total Award: \$230,000

- 02-06: NSF/DMS - 0203175 (PI Dr. James Burke) (07/01/02 - 06/30/06)
 Optimization: theory, algorithms, and applications
 Role: Principal Investigator 17% salary support
 Total Award: \$210,398
- 99-02: NSF/DMS - 9971852 (PI Dr. James Burke) (08/01/99 - 07/31/02)
 Optimization: theory, algorithms, and applications
 Role: Principal Investigator 12% salary support
 Total Award: \$105,000
- 93-95: NSF/DMS - 9303772 (PI Dr. James Burke) (06/22/93 - 12/31/95)
 Eigenvalue optimization and robust mathematical programming
 Role: Principal Investigator 17% salary support
 Total Award: \$40,200
- 91-92: NSF/DMS - 9102059 (PI Dr. James Burke) (06/01/91 - 12/31/92)
 Eigenvalue optimization and robust mathematical programming
 Role: Principal Investigator 17% salary support
 Total Award: \$21,100
- 88-90: NSF/DMS - 8803206 (PI Dr. James Burke) (07/01/88 - 12/31/90)
 Exact penalty functions in constrained optimization
 Role: Principal Investigator 17% salary support
 Total Award: \$42,500
- 88-89: NSF/SCREMS - 8803206 (PI Dr. R. Tyrrell Rockafellar) (07/15/88 - 12/31/89)
 Scientific computing research in mathematical sciences
 Role: Investigator and Proposal Author (Computing Equipment Purchases)
 Total Award: \$44,000
- 86-88: NSF/DMS - 8602399 (PI Dr. James Burke) (06/15/86 - 11/30/88)
 Exact penalty functions in constrained optimization
 Role: Principal Investigator 8.5% salary support
 Total Award: \$16,000

National Aeronautics and Space Administration

- 98-01: NASA/NGT 5-66-S02 (PI Dr. James Burke) (09/01/98 - 08/31/01)
 Applied mathematics
 Role: Principal Investigator (Student Support)
 Total Award: \$66,000

United States - Israel Binational Science Foundation

- 91-94: BSF - 90-00455 (PI Dr. Alexander Ioffe) (07/01/91 - 06/30/94)
 Variational analysis and optimization
 Role: Investigator 4% Salary
 Total Award: \$40,200

Air Force Office of Scientific Research

- 86-88: AFOSR/ISSA - 860080 (PI Dr. James Burke) (06/15/86 - 11/30/88)
 Exact penalty functions in constrained optimization
 Role: Principal Investigator 8.5% salary support
 Total Award: \$16,000

Publications (66)

- 2011: - "On the subdifferential regularity of max root functions for polynomials",
 with Julia Eaton, *Journal of Nonlinear Analysis Series A: Theory, Methods & Applications*,
 Published online February 23, 2011, DOI information: 10.1016/j.na.2011.01.021.
- "Learning using state space kernel machines",
 with Aleksandr Aravkin, Bradley Bell and Gianluigi Pillonetto, accepted for publication in
International Federation of Automatic Control: 2011, February 2011.
- 2010: - "An ℓ_1 -Laplace Robust Kalman Smoother",
 with Aleksandr Aravkin, Bradley Bell and Gianluigi Pillonetto, accepted for publication in

- IEEE Transactions on Automatic Control*, October 2010.
- 2009: - “An Inequality Constrained Kalman-Bucy Smoother by Interior Point Likelihood Maximization”, with Bradley Bell and Gianluigi Pillonetto, *Automatica*, **45**(2009) 25-33.
- “Weak sharp minima revisited, part III: error bounds for differentiable convex inclusions”, with Sien Deng, *Mathematical Programming*, **116**(2009) 37-56.
- 2008: - “Automatic differentiation of implicit functions and optimal values”, with Bradley Bell, in *Advances in Automatic Differentiation*, Eds. C. Bischof, H. Bücker, P. Hovland, U. Naumann, and J. Utke, Springer, 2008, pp. 67-77.
- 2007: - “The Speed of Shor’s R-Algorithm”, with Adrian S. Lewis and Michael L. Overton, *IMA Journal of Numerical Analysis*, **28**(2008) 711-720.
- “Convexity and Lipschitz behavior for small pseudospectra”, with Adrian S. Lewis and Michael L. Overton, *SIAM J. Matrix Analysis*, **29**(2007) 586-595.
- “Spectral conditioning and pseudospectral growth”, with Adrian S. Lewis, and Michael L. Overton, *Numerische Mathematik*, **107**(2007) 27-37.
- 2006: - “Characterizations of the Polynomial Numerical Hull of Degree k ”, with Anne Greenbaum, *Lin. Alg. Appl.*, **419**(2006) 37-47.
- “HIFOO - A MATLAB package for fixed-order controller design and H_∞ optimization”, with Didier Henrion, Adrian S. Lewis, and Michael L. Overton, in the proceedings of the International Federation of Automatic Control Conference on Robust Control Design, Toulouse, July 2006.
- “Stabilization via nonsmooth, nonconvex optimization”, with Didier Henrion, Adrian S. Lewis, and Michael L. Overton, *IEEE Transactions on Automatic Control*, **51**(2006) 1760-1769.
- 2005: - “Weak sharp minima revisited, Part II: Applications to Linear Regularity and Error Bounds”, with Sien Deng, *Mathematical Programming*, **104**(2005) 236-261.
- “Variational Analysis of Functions of the Roots of Polynomials”, with Adrian Lewis and Michael Overton, *Mathematical Programming*, **104**(2005) 263-292.
- “A robust gradient sampling algorithm for nonsmooth, nonconvex optimization”, with Michael Overton and Adrian Lewis, *SIAM J. Optimization*, **15**(2005) 751-779.
- “A new proximal point iteration that converges weakly but not in norm”, with H. H. Bauschke, F. R. Deutsch, H. S. Hundal, and J. D. Vanderwerff, *Proc. Amer. Math. Soc.*, **133**(2005), 1829-1835.
- 2004: - “Pseudospectral components and distance to controllability”, with Michael Overton and Adrian Lewis, *SIAM J. Matrix Anal. Appl.*, **26**(2004) 350-361.
- “Variational analysis of the abscissa mapping for polynomials via the Gauss-Lukas theorem”, with Adrian Lewis and Michael Overton, *J. Global Optimization*, **28**(2004), 259-268.
- “Differentiability of cone-monotone functions on separable Banach space”, with Jonathan Borwein and Adrian Lewis, *Proc. of the American Math. Soc.*, **132**(2004), 1067-1076.
- 2003: - “Robust stability and a criss-cross algorithm for pseudospectra”, with Adrian Lewis and Michael Overton, *IMA J Num Anal*, **23**(2003), 1-17.
- “Variational analysis applied to the problem of optical phase retrieval”, with Russell Luke, *SIAM J. Control and Optimization*, **42**(2003), 576-575.
- “Optimization and Pseudospectra, with applications to robust stability”, with Adrian Lewis and Michael Overton, *SIAM Journal on Matrix Analysis and Applications*, **25**(2003), 80-104.
- “A Nonsmooth, Nonconvex Optimization Approach to Robust Stabilization by Static Output Feedback and Low-Order Controllers”, with Michael Overton and Adrian Lewis, in the proceedings of the International Federation of Automatic Control 2003 Conference on Robust Control Design, Milan, June 2003.
- 2002: - “Optical wavefront reconstruction: theory and numerical methods”, with Russell Luke and Richard Lyon, *SIAM Review*, **44**(2002), 169-224.
- “Weak sharp minima revisited, Part I: basic theory”, with Sien Deng, *Control & Cybernetics*, **31**(2002), 439-469.
- “Two numerical methods for optimizing matrix stability”, with Adrian Lewis and Michael Overton, *Linear Algebra and its Applications*, **351-352**(2002), 117-145.
- “Approximating subdifferentials by random sampling of gradients”, with Adrian Lewis and Michael Overton, *Mathematics of Operations Research*, **27**(2002), 567-584.
- “The complexity of a non-interior path following method for the linear complementarity problem”, with Song Xu, *J. Optimization Theory and Applications*, **112**(2002), 53-76.
- 2001: - “Variational analysis of non-Lipschitz spectral functions”,

- with Michael Overton, *Math. Programming*, **90**(2001), 317–351.
- “Optimal stability and eigenvalue multiplicity”,
with Adrian Lewis and Michael Overton, *Foundations of Computational Mathematics*, **1**(2001), 205–225.
- 2000: - “Variational analysis of the abscissa mapping for polynomials”,
with Michael Overton, *SIAM Journal on Control and Optimization*, **39**(2000), 1651–1676.
- “Optimizing matrix stability”,
with Adrian Lewis and Michael Overton, *Proc. of the American Math. Soc.*, **129**(2000), 1635–1642.
- “A non–interior predictor–corrector path following algorithm for the monotone linear complementarity problem”,
with Song Xu, *Mathematical Programming*, **87**(2000), 113–130.
- “On the super–linear convergence of the variable metric proximal point algorithm using Broyden and BFGS matrix secant updating”, with M. Qian, *Mathematical Programming*, **88**(2000), 157–181.
- “Fast algorithms for phase diversity and phase retrieval”,
with Russell Luke and Richard Lyon, *Proceedings for the Workshop on Computational Optics and Imaging for Space Applications: May 2000*, Editor: Richard Lyon, NASA/Goddard Space Flight Center.
- 1999: - “The global linear convergence of a non–interior path–following algorithm for linear complementarity problems”,
with S. Xu, *Mathematics of Operations Research*, **23**(1999), 719–734.
- “A polynomial time interior–point path–following algorithm for LCP based on Chen–Harker–Kanzow smoothing techniques”, with S. Xu, *Mathematical Programming*, **86** (1999), 91–103.
- “The variable metric proximal point algorithm for monotone operators”,
with M. Qian, *SIAM J. Control and Optimization*, **37** (1999), 353–375.
- 1998: - “A non–interior predictor–corrector path following method for LCP”,
with S. Xu, *Reformulation– Nonsmooth, Piecewise Smooth, Semi–smooth, and Smoothing Methods*, Editors: Liquan Qi and Masao Fukushima, Kluwer Academic Publishers, 1998, pp. 45–64.
- “On the local super–linear convergence of a matrix secant implementation of the variable metric proximal point algorithm for monotone operators”, with M. Qian, *Reformulation– Nonsmooth, Piecewise Smooth, Semi–smooth, and Smoothing Methods*, Editors: Liquan Qi and Masao Fukushima, Kluwer Academic Publishers, 1998, pp. 317–334.
- 1997: - “On the Lidskii–Vishik–Lyusternik perturbation theory for eigenvalues of matrices with arbitrary Jordan structure”,
with J. Moro and M. L. Overton, *SIAM J. Matrix Anal. Appl.*, **18** (1997), 793–817.
- 1996: - “A unified analysis of Hoffman’s bound via Fenchel duality”,
with P. Tseng, *SIAM J. Optimization*, **6** (1996), 265–282.
- “A Gauss–Newton method for convex composite optimization”,
with M. C. Ferris, *Mathematical Programming*, **71** (1996), 179–194.
- “A relative weighting method for estimating parameters and variances in multiple data sets”,
with B. Bell and A. Schumitzky, *Computational Statistics and Data Analysis*, **22** (1996), 119–135.
- 1994: - “Exposing constraints”, *SIAM J. Control and Optimization*,
with J. J. Moré, **4**(1994), 573–595.
- “Differential properties of the spectral abscissa and the spectral radius for analytic matrix-valued mappings”,
with M. L. Overton, *Journal of Nonlinear Analysis, Theory, Methods, and Applications*, **23**(1994), 467–488.
- 1993: - “Weak sharp minima in Mathematical programming,”
with M. C. Ferris, *SIAM J. Control and Optimization*, **31**(1993), 1340–1359.
- “Translational cuts for minimization,”
with A. A. Goldstein, P. Tseng, and Yinyu Ye, *Complexity in Numerical Optimization*, Ed. P. Pardalos, (1993) pp. 57–72.
- 1992: - “Optimality conditions for non-finite valued convex composite functions”,
with R. Poliquin, *Mathematical Programming*, **57** (1992), 103–120.
- “A robust trust region method for constrained optimization”, *SIAM J. Optimization*, **2**(1992), 325–347.
- “On the Clarke subdifferential of the distance function to a closed set”,
with M. C. Ferris and M. Qian, *J. Math. Analysis and Applications*, **166** (1992), 199–213.
- “Stable perturbations of nonsymmetric matrices”,
with M. L. Overton, *Linear Algebra and Its Applications*, **171**(1992), 249–273.
- “On the subdifferentiability of functions of a matrix spectrum, I: Mathematical foundations”,
with M. L. Overton, *Nonsmooth Optimization: Methods and Applications*, Ed. F. Giannessi, (1992) pp. 11–18.
- “On the subdifferentiability of functions of a matrix spectrum, II: Subdifferential formulas”,
with M. L. Overton, *Nonsmooth Optimization: Methods and Applications*, Ed. F. Giannessi, (1992) pp. 19–29.
- 1991: - “Weak directionally closed generalized subdifferentials”,
with L. Qi, *J. Math. Analysis and Applications*, **159**(1991), 485–499.
- “Calmness and exact penalization”, *SIAM J. Control and Optimization*, **29** (1991), 493–497.

- “An exact penalization viewpoint of constrained optimization”, *SIAM J. Control & Opt.*, **29** (1991), 968–998.
- 1990 - “Characterization of solution sets to convex programs”,
with M. C. Ferris, *Operations Research Letters*, **10** (1990), 57–60.
- “Convergence properties of trust region methods for linear and convex constraints”,
with J. J. Moré and G. Toraldo, *Mathematical Programming*, **47** (1990), 305–336.
- “On the identification of active constraints II: the nonconvex case”, *SIAM J. Numer. Anal.*, **27** (1990), 1081–1102.
- 1989 - “A robust sequential quadratic programming method”,
with S.-P. Han, *Mathematical Programming*, **43** (1989), 277–303.
- “A sequential quadratic programming method for potentially infeasible mathematical programs”,
J. Math. Analysis and Applications, **139** (1989), 319–351.
- 1988 - “On the identification of active constraints”,
with J. J. Moré, *SIAM J. Numer. Anal.*, **25** (1988), 1197–1211.
- 1987 - “Second order necessary and sufficient conditions for convex composite NDO”,
Mathematical Programming, **38** (1987), 287–302.
- 1986 - “A Gauss-Newton approach to solving generalized inequalities”,
with S.-P. Han, *Mathematics of Operations Research*, **11** (1986), 632–643.
- 1985 - “Descent methods for composite nondifferentiable optimization problems”,
Mathematical Programming, **33** (1985), 260–279.

Software Development

- HIFOO: H-Infinity Fixed Order Optimization (2006)
A MATLAB package for fixed-order controller design.
James Burke, Didier Henrion, Adrian Lewis, and Michael Overton.
- HANSO: Hybrid Algorithm for Non-Smooth Optimization (2006)
A MATLAB package for non-smooth non-convex optimization.
James Burke, Adrian Lewis, and Michael Overton.
- GradSam: Gradient Sampling Algorithm for Non-Smooth Optimization (2005)
A MATLAB package for non-smooth non-convex optimization.
James Burke, Adrian Lewis, and Michael Overton.
- SPK: System for Population Kinetics (2006)
A C++ package with Java web interface for modeling and parameter estimation in population kinetics.
A laboratory-wide effort at the Resource for Population Kinetics (PI Dr. Paolo Vicini).
- SAAM II: Simulation, Analysis, and Modeling Software (2000)
A graphical programming environment for compartmental kinetic modeling, simulations, and data analysis.
A laboratory-wide effort at the Resource for Kinetic Analysis (PI Dr. David Foster).
- ASTRAL: Active Set Trust-Region Algorithm (2007)
MATLAB, C++, and FORTRAN packages for large-scale optimization problems with bound constraints.
James Burke and Liang Xu.

Invited Presentations (63)

- 2010: - “Variational analysis of S.A.G.E. functions”,
Winter Meeting of the Canadian Mathematical Society: 2010, Vancouver, December, 2010.
- “Iterative re-weighting algorithms for sparsity optimization”,
Winter Meeting of the Canadian Mathematical Society: 2010, Vancouver, December, 2010.
- 2009: - “Kalman Filtering with State Constraints”,
International Symposium on Mathematical Programming: 2009, Chicago, August 2009.
- 2008: - “Merging Trust-Region and Limited Memory Technologies for Large-Scale Nonlinear Optimization”,
The Second International Conference on Nonlinear Programming with Applications 2008, Beijing, April.
- 2007: - “Statistical Mixture Models, Bender’s Decomposition, and Interior Point Algorithms”,
Eighth US-Mexico Workshop on Optimization and its Applications, Huatulco, Mexico (January).
- “Characterizations of the Polynomial Numerical Hull of Degree k ”,
Symposium on Applied Linear Algebra, Canadian Applied and Industrial Mathematics Society Annual Meeting, Banff, Alberta (May).
- “Bridge regression for model selection”, *Minisymposium on Nonsmooth Analysis*,
Second Mathematical Programming Society International Conference on Continuous Optimization,
McMaster University, Hamilton, Ontario, Canada (August).
- 2006: - “Eigenvalues and variational analysis”,

- International Conference on Nonlinear Programming with Applications*,
Fudan University, Shanghai, China (May).
- “Nonparametric density estimation”,
Scientific Computing Seminar, Courant Institute, NYU, NY (October).
 - 2005: - “Variational analysis of functions of the roots of polynomials,”
Foundational of Computational Mathematics Conference,
Universidad de Cantabria, Santander, Spain (June).
 - “The Blondel Belgian chocolate prize for polynomial stabilization: insights from nonsmooth optimization”,
PIMS Distinguished Lecture in Scientific Computing,
Pacific Institute for Mathematical Sciences, Vancouver, B.C., Canada (March).
 - 2004: - “Optimization of the Pseudospectral Abscissa”,
SIAM Annual Meeting, Portland, OR (June).
 - “Variational Analysis on the Roots of Polynomials and the Spectra of Matrices”,
Fourth World Congress of Nonlinear Analysts (WCNA-2004), Orlando, FL (July).
 - 2003: - “Mathematical, statistical, and algorithmic issues in the evaluation of PK, PD, and disease progression models”,
The American Association of Pharmaceutical Scientists Annual Meeting, Salt Lake City UT (October).
 - 2002: - “The Applied and Computational Mathematical Sciences Program at the University of Washington,”
Winter Meeting of the American Mathematical Society, San Diego, CA (January).
 - “Descent algorithms based on random sampling of gradients,”
Foundations of Computational Mathematics Workshop on Optimization, Institute for Mathematics and its
Applications, Minneapolis, MN (August).
 - “Variational analysis on functions of the roots of polynomials and the Gauss-Lucas Theorem,”
First Joint Meeting of the American Mathematical Society and the Unione Matematica Italiana, Pisa, Italy (June).
 - “Gauss’s approach to the variational analysis of functions of the roots of polynomials”,
West Coast Optimization Meeting, Simon Fraser University (May).
 - “Descent algorithms based on random sampling of gradients,”
SIAM Conference on Optimization, Toronto, Canada, May 2002.
 - 2001: - “Non-Symmetric Eigenvalue Optimization Problems”,
International Workshop on Optimization and Control with Applications,
Ettore Majorana Centre for Scientific Culture,
International School of Mathematics, Erice, Italy (July).
 - “Approximating of subdifferentials by random sampling of gradients”,
West Coast Optimization Meeting, Simon Fraser University, Burnaby, BC (May).
 - 2000: - “Variational Analysis for Spectral Functions”,
17th International Symposium on Mathematical Programming, Nonsmooth Analysis Cluster, Atlanta, GA (August).
 - 1999: - “The Newton polygon and eigenvalue perturbation theory for matrices”,
Mathematics Colloquium, University of California, Davis, CA (April).
 - “Variational Analysis for Spectral Functions”,
National Symposium on Constrained Optimization,
University of New South Wales, Sydney, Australia, December 1999.
 - “On Hoffman bounds for affine convex inclusions”,
University of New South Wales, Sydney, Australia, December 1999.
 - 1998: - “The Newton polygon and eigenvalue perturbation theory for matrices”,
Applied Mathematics Colloquium, University of Washington (May).
 - “Non-parametric population analysis”,
West Coast Optimization Meeting, Seattle, WA, October 1998.
 - “Non-parametric population analysis”,
Workshop on Nonsmooth and Smoothing Methods, City University of Hong Kong, December 1998.
 - “Error bounds for convex inclusions”,
Workshop on Error Bounds in Variational Analysis and Applications, City University of Hong Kong, December 1998.
 - “On the numerical performance of a non-interior path-following algorithm for the linear complementarity problem”,
International Conference on Nonlinear Programming and Variational Inequalities,
City University of Hong Kong, December 1998.
 - 1997: - “A Variable Metric Proximal Point Algorithm”,
West Coast Optimization Meeting, Vancouver, B.C. (April).
 - 1995: - “Variational properties of the spectral abscissa and spectral radius”,
Applied Mathematics Colloquium, University of Alberta, Edmonton, Alberta, (February).

- “A trust–region approach to limited memory methods for unconstrained optimization”,
Summer Seminar on ”Mathematics of Numerical Analysis: Real Number Algorithms,” Park City, UT (July).
- “Trust–Region subproblems in mathematical programming”,
West Coast Optimization Meeting, Seattle, WA (March).
- “Trust–Region subproblems in mathematical programming”,
Oberwolfach Mathematical Research Institute, Oberwolfach, Germany (February).
- 1994: - “Variational properties of the spectral abscissa and spectral radius”,
Scientific Computing Colloquium, Center for Computational and Experimental Mathematics,
Simon Fraser University, Burnaby, B.C. (March).
- 1993: - “Stable perturbations of nonsymmetric matrices”,
Optimization Seminar, University of Wisconsin at Madison, Madison, WI (February).
- 1992: - “On the Subdifferentiability of Functions of a Matrix Spectrum”,
Mini-Symposium on Eigenvalue Optimization, Fourth SIAM Conference on Optimization, Chicago, Illinois (May).
- “On the Convergence Rate of Algorithms for Convex Composite Optimization”,
Optimization Days, Technion: Israel Institute of Technology, Haifa, Israel (March).
- “Algorithms for Minimization over Convex Polyhedra”,
VI Workshop in Numerical Analysis and Optimization, Oaxaca, Mexico (January).
- 1991: - “Numerical Methods for Constrained Optimization”,
Seminar on Constraint Programming, Computer Science Department,
University of Washington, Seattle, WA (February).
- “Constraint Identification in Mathematical Programming”,
Computer Science Colloquium, University of Naples, Naples, Italy, (June).
- “Convergence Analysis of NLP Trust Region Methods”,
Mini-Symposium on Trust Region Methods for Constrained Optimization,
International Conference on Industrial and Applied Mathematics, Washington, D. C. (July).
- “On the Subdifferentiability of Functions of a Matrix Spectrum”,
Course on Nonsmooth Optimization: Methods and Applications,
Ettore Majorana Centre for Scientific Culture, International School of Mathematics “G. Stampacchia”,
Erice, Sicily (June).
- “Stable Perturbations of Nonsymmetric Matrices”,
Applied and Computational Mathematics Seminar, Simon Frazer University, Burnaby, B.C. (November).
- 1990: - “Robust Trust Region Methods for Constrained Optimization”,
Numerical Analysis Seminar, New York University Courant Institute, NY, NY (February).
- “The Role of Exact Penalization in Mathematical Programming”,
The University of Pau Regional Conference on Optimization, Pau, France (June).
- “Constraint Identification in Mathematical Programming”,
Optimization Seminar, University of Pau, Pau, France (June).
- “Robust Trust Region Methods for Constrained Optimization”,
Numerical Analysis Seminar, Elf Aquitaine, Société Nationale de France, Pau, France (June).
- “Constraint Identification in Mathematical Programming”,
Numerical Analysis Seminar, Institut National de Recherche en Informatique et en Automatique,
Rocquencourt, France (July).
- “Robust Trust Region Methods for Constrained Optimization”,
Mathematical Sciences Colloquium, Rice University, Houston, TX (September).
- “Trust Region Methods for Constrained Optimization”,
Industrial Engineering Colloquium, University of Washington, Seattle, WA (October).
- 1989: - “Robust Methods for Constrained Optimization: A Case Study in Applied Sensitivity Analysis”,
Conference on Sensitivity Analysis, Center for Mathematical Research, Montreal, Quebec (February).
- “Robust Trust Region Methods for Constrained Optimization”,
Computer Science Department Colloquium, University of Wisconsin, Madison, WI (February).
- “Optimality Conditions for Eigenvalue Optimization Problems”,
Air Force Office of Scientific Research Conference on Shape Optimization, Berkeley, CA (May).
- “Second Order Optimality Conditions for Convex Composite Optimization”,
Mini-Symposium on Non-Differentiable Optimization, SIAM Conference on Optimization,
Boston, MA (April).
- “Constrained Optimization via Convex Composite Functions”,
Joint Statistics and Numerical Analysis Seminar, Australian National University, Canberra, Australia (June).

- “Constrained Optimization via Convex Composite Functions”,
Mathematics Colloquium, University of New South Wales, Sydney, Australia, (July).
- “Robust Trust Region Methods for Constrained Optimization”,
MCSD Seminar, Argonne National Laboratories, Argonne, Illinois, (December).
- 1988: - “Trust Region Methods in Numerical Optimization”,
Pacific Northwest Numerical Analysis Conference,
Western Washington University, Bellingham, WA (September).
- 1987: - “Convex Composite Optimization”,
The Numerical Analysis Seminar, Simon Fraser University, Burnaby, B.C. (October).
- “An Exact Penalization Approach to Optimality Conditions in Constrained Optimization”,
Department of Combinatorics and Optimization Colloquium, Waterloo, Ontario, (November).
- 1986: - “Convex Composite Functions in Optimization Theory”,
Applied Mathematics Colloquium, University of Washington, Seattle, Washington (October).
- “An Exact Penalization Viewpoint of Constrained Optimization”,
Pacific West Optimization Conference, University of British Columbia, Vancouver, B.C. (February).
- 1985: - “Karmarkar’s Algorithm for Linear Programming”,
Mathematics Colloquium, University of Illinois at Urbana-Champaign, Urbana, IL (March).
- “Karmarkar’s Algorithm for Linear Programming”,
Kentucky Sectional Meeting of the American Mathematical Society, Lexington, KY (April).
- “Karmarkar’s Algorithm for Linear Programming”,
MCSD seminar, Argonne National Laboratories, Argonne, IL (June).

Conference Organization

- 2010: - Co-organizer, *West Coast Optimization Meeting: Paul Tseng Memorial Conference*,
University of Washington, Seattle, with Rekha Thomas.
- 87 - 07: - Co-organizer, *Annual West Coast Optimization Meeting*,
University of Washington, Seattle, with Terry Rockafellar and Paul Tseng.
- 2001: - Programme Committee, *The 5th International Conference on Optimization: Techniques and Applications*,
Hong Kong, (December).
- 1999: - Co-Organizer, *National Symposium on Constrained Optimization*,
University of New South Wales, Sydney, Australia, December 1999.
- 1998: - Organizing Committee, *International Conference on Nonlinear Programming and Variational Inequalities*,
City University of Hong Kong, December 1998
- Session organizer for the Nonlinear Programming stream, *INFORMS in Seattle, 1998* (October).
- 1992: - Co-Organizer with Paul Tseng, *Minisymposia on Advances in Proximal Point Algorithms*,
Fourth SIAM Conference on Optimization, Chicago, Illinois (May).
- Co-Organizer with Paul Tseng, *Minisymposia on Advances in Splitting Methods*,
Fourth SIAM Conference on Optimization, Chicago, Illinois (May).

TEACHING

Thesis Supervision

Ph.D. Students (9)

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| 2010 | Aleksandr Aravkin: “Robust Methods for Kalman Filtering/Smoothing and Bundle Adjustment,”
Mathematics, University of Washington, July. |
| | Julia Eaton: “Variational Properties of Polynomial Root Functions and Spectral Functions,”
Mathematics, University of Washington, May. |
| | Liang Xu: “Merging Trust-Region and Limited Memory Technologies for Large-Scale Optimization,”
Mathematics, University of Washington, March. |
| | Jonathan Cross: “Spectral Abscissa Optimization using Polynomial Stability Conditions,”
Mathematics, University of Washington, March. |
| 2009 | Qiuying Lin: “Sparsity and Non-Convex, Non-Smooth Optimization,”
Mathematics, University of Washington, December. |
| 2006 | Yeongcheon Baek: “An Interior Point Approach to Nonparametric Mixture Models,”
Mathematics, University of Washington, December. |
| 2001 | Russell Luke: “Analysis of Optical Wavefront Reconstruction and Deconvolution in Adaptive Optics,”
Applied Mathematics, University of Washington, June. |

1998	Song Xu:	“Non-Interior Path Following Methods for Complementarity Problems,” Mathematics, University of Washington, June.
1992	Maijian Qian:	“The Variable Metric Proximal Point Algorithm: Convergence Theorey and Applications,” Mathematics, University of Washington, July.

Masters Students (18)

2009	George Bouvier:	“The Mathematics of Gamma Knife Technology,” Mathematics, University of Washington, May.
2007	Piotr Jagiello:	“Maching Learning and Optimization,” Mathematics, University of Washington, June.
2003	Joel Hindorff:	“Bridge Sampling for Hierarchical Density Estimation,” Applied Mathematics, University of Washington, August.
	Shenyu Zhang:	“Expected Value at Risk,” Mathematics, University of Washington, June.
2002	Le Sun:	“Risk Models in Finance,” Mathematics, University of Washington, June.
2000	Brett Berger:	“Economic Models of Technology,” Mathematics, University of Washington, December.
1999	Greg Burd:	“The Capital Asset Pricing Model,” Mathematics, University of Washington, August.
1998	Michael Kremer:	“Influence Functions in Portfolio Optimization,” Mathematics, University of Washington, June.
1997	Chee Sim:	“Quadratic Programming with Ball Constraints,” Mathematics, University of Washington, June.
1994	Pamela Shaw:	“Trust-Region Methods,” Mathematics, University of Washington, June.
1991	Jeffery Lim:	“Mulicommodity Flow Problems and the Dantzig-Wolfe Decomposition Principal,” Mathematics, University of Washington, June.
1989	Jiseong Park:	“On the Infimal Convolution Operator for Convex Matrix Functions,” Mathematics, University of Washington, August.
	Greg Langkamp:	“Interior Point Methods,” Mathematics, University of Washington, March.
	Lillian Tjahjadi:	“Trust-Region Methods for Nonlinear Equations,” Mathematics, University of Washington, December.
1988	Thomas Leonard:	“On the Second-Order Subdifferential for Convex Functions,” Mathematics, University of Washington, November.
	Thanh Hoang:	“Convex Analysis and Optimal Experimental Design,” Mathematics, University of Washington, December.
	Donna Calhoun:	“Decomposition Methods for Linear Programs,” Mathematics, University of Washington, June.
1987	Ray Blackburn:	“Algorithms for Solving Nonlinear Equations and Inequalities,” Mathematics, University of Washington, March.

Undergraduate Honors (1)

1990	Mary Culic:	“The Affine Rescaling Algorithm for Linear Programming,” Mathematics, University of Washington, June.
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Current Ph.D. Students (4)

Yun Zhang:	”Sparsity Techniques in Portfolio Optimization” Applied Mathematics, University of Washington.
Chris Jordan-Squire:	”Convex Composite Optimization” Mathematics, University of Washington.

Program Development

The Computational Finance Program (2004)

The Computational Finance Program offers graduate training in finance, statistics, scientific computing and information science for application to modern problems in the finance, energy, and insurance industries. The

development of this program began in 1999, and initiated in 2004. The team was led by Doug Martin of the Statistics Department who provided the initial vision for the program. He was assisted by Eric Zivot (Econ), Chris Burdzy (Math), and James Burke (Math). (<http://www.stat.washington.edu/compfin/index.shtml>)

The Applied and Computational Mathematical Sciences Program (1998)

In the Fall of 1995 James Burke wrote a proposal outlining a future mathematical sciences undergraduate degree program to be jointly administered by the Departments of Applied Mathematics, Computer Science and Engineering, Mathematics, and Statistics. As conceived the program would replace the Math Department undergraduate degree in mathematical sciences and would be fundamentally interdisciplinary in nature. The vision was to provide a more focused and well-defined undergraduate experience in the mathematical sciences with a common set of core courses in computation and statistics as well as continuous and discrete mathematical modeling. This basic core would be followed by a set of pathway specific core and elective courses in a students area of emphasis. The proposal was favorably received by the mathematical sciences Departments and further details were worked out by the initial team of Loyce Adams (Amath), Jim Burke (Math), Tom Duchamp (Math), and Bob O'Malley (Amath) with strong support from the Chairs of Math (Doug Lind) and Amath (K.K. Tung). The program is now a national model for interdisciplinary degrees in the mathematical sciences. It was the success of this program and the resulting collaborative spirit that it engendered between the mathematical sciences departments that laid the foundation for the successful application to the NSF program in the *Vertical Integration of Research and Education in the Mathematical Sciences* (VIGRE). Indeed, the ACMS Program is highlighted in the original VIGRE proposal and its 2003 renewal. In addition, a biographical sketch for James Burke was submit for both VIGRE proposals emphasizing his pivotal role in the success of these programs (4 biographical sketches from Math were included in the 2003 proposal). (<http://www.ms.washington.edu/acms/index.html>)

The Linear Analysis Prelim Course Sequence in Mathematics (1995)

In 1994 the PDE group, numerical analysis, and optimizers formed a group to propose the addition of a new preliminary exam course sequence in mathematics since the existing sequences did not well prepare students in the fundamentals required to work with this group of faculty. The goal was to better utilize the mentoring capability of this group. James Burke was a member of the team that formulated the content of this sequence. The team's efforts were successful and resulted in the introduction of the Linear Analysis sequence (Math 554-5-6) and its associated preliminary exam. In addition, James Burke taught the Fall term of this sequence in its first year providing an extensive set of typeset notes and problem sets for future instructors. These notes, now extensively edited, continue to form the basis for Fall quarter of the Linear Analysis sequence. Presently, the backbone of the course is a set of notes prepared by Ken Bube. In the last few years James Burke has begun the process of typesetting and editing these notes. (<http://www.math.washington.edu/Grads/Programs/phd-exams.html>)
(<http://www.math.washington.edu/burke/crs/archive.html>)

Masters Degree in Optimization (1988)

In the Fall of 1985, Professors Terry Rockafellar and James Burke began developing a sequence of undergraduate and graduate courses in continuous and discrete optimization. This effort has culminated in the University of Washington's undergraduate sequence Math 407-8-9, and graduate courses Math 514-5-6-7 and 509. These courses form the infrastructure for Math Department's Masters Degree in Optimization. This degree option provides students with a degree that can be successfully marketed for careers in industry. Professor Rockafellar and James Burke are credited with the development of this degree and assist in its continued maintenance and success. James Burke has supervised 17 Masters Degrees in Optimization. (<http://www.math.washington.edu/Grads/Programs/ms-reqts.html>)
(<http://www.math.washington.edu/Grads/Programs/ms-reqts.html>)

Course Development

Since 1997 James Burke has developed all of his courses on the web. Most of the materials for these course can be found by going to the following websites.

Math 126:	Calculus,	http://www.math.washington.edu/burke/crs/126/
Math 308:	Linear Algebra,	http://www.math.washington.edu/burke/crs/308/
Math 407:	Linear Optimization,	http://www.math.washington.edu/burke/crs/407/
Math 408:	Nonlinear Optimization,	http://www.math.washington.edu/burke/crs/408/
Math 408:	Financial Optimization,	http://www.math.washington.edu/burke/crs/408f/
Math 515:	Fundamentals of Optimization,	http://www.math.washington.edu/burke/crs/515/

Math 516:	Numerical Optimization,	http://www.math.washington.edu/burke/crs/516/
Math 554:	Linear Analysis,	http://www.math.washington.edu/burke/crs/554/
Math 555:	Linear Analysis,	http://www.math.washington.edu/burke/crs/555/

Seminars

The weekly Optimization Seminar in Mathematics has run every term since James Burke arrived at the University of Washington in Fall of 1985. Since then Professor Burke has been a regular contributor to, and organizer of, this seminar.

SERVICE

Department and University Committees

09 - 10: Priority Committee
 08 - 10: Faculty Council on Student Affairs and Milliman Committee
 06 - 10: Computational Finance Steering Committee
 06 - 08: ACMS Steering and Milliman Committees
 05 - 06: ACMS Steering, Computational Finance Steering, and Appointments Committees
 04 - 05: Computational Finance Steering Committee
 03 - 04: Computational Finance Steering Committee,
 and organizer of the retirement celebration for Terry Rockafellar
 02 - 03: Computational Finance Steering Committee
 99 - 00: Teaching Credit and Job Placement Committees
 97 - 98: Promotions, Chairman Selection, and ACMS Steering Committees
 96 - 97: Library and ACMS Steering Committees
 95 - 96: ACMS Steering Committee
 93 - 94: Computing and Colloquium Committees
 91 - 92: Computing and Undergraduate Curriculum and Textbook Committees
 90 - 91: Computing, Scientific Computing, and Undergraduate Curriculum and Textbook Committees
 89 - 90: Computing, Scientific Computing, and Undergraduate Curriculum and Textbook Committees
 88 - 89: Computing, Graduate Supervisory, and Teaching Assistant Supervisory Committees
 87 - 88: Computing Committee
 86 - 87: Appointments Committee
 85 - 86: Appointments Committee

Applied and Computational Mathematical Science Program

01 - 05: Director

Editorial Positions

07 - 10:	Editorial Board	<i>Set Valued and Variational Analysis</i>
05 - 10:	Editorial Board	<i>Pacific J. of Optimization</i>
99 - 03:	Associate Editor	<i>Mathematics of Operations Research</i>
94 - 00:	Corresponding Editor	<i>SIAM J. Control and Optimization</i>
92 - 94:	Associate Editor	<i>SIAM J. Control and Optimization</i>

Reviewer

Agencies

United States:	NSF(88 - 05), DOE (93), AFOSR (88 - 90),
Canada:	NSERC (02 - 96), Killam Program (95)
Australia:	ARC (03 - 05)

Programs

04 - 05: External reviewer for the Bachelor of Science Degree in Applied Mathematics and Computer Science, University of Wisconsin - Milwaukee.

External Ph.D. Examiner

2004:	Mr. Warren Hare	Mathematics, Simon Fraser University, Burnaby, Canada
1990:	Mr. M.B. El Abdouni	Mathematics, University of Pau, Pau, France.

Journals

Refereed for each of the following journals at least once in the last 22 years, in most cases several times, and in a few cases annually

Journal of Optimization Theory and Applications
 Mathematics of Operations Research
 Operations Research Letters
 Applied Mathematics Letters
 Applied Mathematics and Optimization
 Journal of Mathematical Analysis and Applications
 Nonlinear Analysis: Theory, Methods and applications
 Linear Algebra and Its Applications
 Management Science
 Utilities Mathematica
 Mathematics of Computation
 Constructive Approximation Theory
 SIAM J. on Control and Optimization
 SIAM J. on Numerical Analysis
 SIAM J. on Matrix Analysis and Applications
 SIAM J. on Optimization
 Convex Analysis
 Set-Valued Analysis
 Pacific J. of Optimization
 J. Optimization Methods and Software
 J. Global Optimization

Community Outreach

04 - 10: Middle School Math Team Coordinator
 Assumption - St. Bridget School, 6220-32nd Ave NE, Seattle, WA 98115