

# FLORIAN A. POTRA

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**DATE OF BIRTH:** December 7, 1950                      **PLACE OF BIRTH:** Cluj, Romania  
**CITIZENSHIP:** American                              **MARITAL STATUS:** Married, one son (born 1977)

## EDUCATION

- 1976–1980    University of Bucharest, and the National Institute for Scientific and Technical Creation (INCREST). Advisers: C. Foias and C. Apostol. Ph.D. in Mathematics (field: applied functional analysis), December 1980.
- 1973–1974    Graduate studies at Babeş–Bolyai University, Cluj, Romania, Certificate of Specialization in Mathematical Analysis (M.S.), 1974.
- 1969–1973    Babeş–Bolyai University, Cluj, Romania, Diploma in Mathematics (B.S.++), 1973.

## EMPLOYMENT

- 2003–present    Faculty Appointee, Mathematical and Computational Sciences Division, The National Institute of Standards and Technology.
- 1998–present    Professor, Department of Mathematics and Statistics, UMBC.
- 1998–present    Affiliate Professor, Department of Computer Science and Electrical Engineering, UMBC.
- 1998–1999      Chair, Department of Mathematics and Statistics, UMBC.
- 1997–1998      Program Director for Applied Math and Computational Math, NSF.
- 1992–1997      Professor, Department of Computer Science, University of Iowa.
- 1990–1997      Professor, Department of Mathematics, University of Iowa.
- 1984–1990      Associate Professor, Department of Mathematics, University of Iowa.
- 1983–1984      Visiting Assistant Professor, Department of Mathematics & Statistics, University of Pittsburgh.
- 1982–1983      Andrew Mellon Postdoctoral Fellow, Department of Mathematics & Statistics, University of Pittsburgh.
- 1978–1982      Scientist, Department of Mathematics, The National Institute for Scientific and Technical Creation (INCREST), Bucharest, Romania.
- 1974–1978      Analyst, Digital Processing Center, Geological and Geophysical Prospecting Company for Hydrocarbons (IPGGH), Bucharest, Romania.

## SHORT TERM VISITING POSITIONS

- 2006 Università degli Studi di Bergamo (Italy), Université Catholique de Louvain (Louvain-la-Neuve, Belgium), University of Karlsruhe (Germany).
- 2002 Università La Sapienza (Rome, Italy).
- 2000 Konrad Zuse Zentrum (Berlin, Germany).
- 1999 City University of Hong Kong.
- 1996 University of New South Wales (Sydney, Australia), Università La Sapienza (Rome, Italy), Università degli Studi (Florence, Italy), INRIA (Rocquencourt, France).
- 1993 University of Geneva (Switzerland).
- 1991 Argonne National Laboratory.
- 1990 Lawrence Livermore National Laboratory, Rice University, University of Catania (Italy), Konrad Zuse Zentrum (Berlin), University of Darmstadt (Germany).
- 1987 University of Karlsruhe (Germany).

## LANGUAGES

Romanian, English, French, German, Italian, Portuguese, Spanish, Russian.

## AREAS OF RESEARCH INTEREST

Robotics. Numerical optimization. Numerical solution of nonlinear differential and integral equations. Mathematical modeling in applied sciences. Applied functional analysis. Numerical algorithms for parallel computers. Bioinformatics.

## CONSULTING

Sandia National Labs, United Technologies Research Center, AgentSmith Inc.

## PARTICIPATION IN INTERDISCIPLINARY ACTIVITIES

- 2004– Metrology for Gene Expression, The National Institute of Standards and Technology.
- 2004– Robust Optimization of Machining, The National Institute of Standards and Technology.
- 2002– DaVinci Project: Differential Algebraic and Variational Inequalities in Control and sImulation, <http://kumar.cis.upenn.edu/davinci/> .
- 2001–2004 Bioinformatics Research Center, <http://www.brc.umbc.edu/> .
- 1997–1998 Center for Virtual Proving Ground Simulation: Mechanical and Electromechanical Systems : A Multi-University NSF/Army/ Industry/University Cooperative Research Center.
- 1993–1997 CGRER: Center for Global and Regional Environmental Research.
- 1992–1997 Applied Mathematical and Computational Sciences Ph.D. Program.
- 1987–1996 CCAD: Center for Simulation and Design Optimization of Mechanical Systems.

## **PATENTS**

James W. Fuller , Indraneel Das , Florian Potra and Jun Ji : SYSTEM AND METHOD OF APPLYING INTERIOR POINT METHOD FOR ONLINE MODEL PREDICTIVE CONTROL, Serial Number 11 / 150 , 703 Filed in the United States of America on June 10 , 2005.

## **EDITORSHIP**

Associate Editor, SIAM Journal on Optimization (1991-1999).

Associate Editor, Journal of Optimization Theory and Applications (since 1991).

Regional Editor for the Americas, Optimization Methods and Software (since 1997).

Associate Editor, Numerical Functional Analysis and Optimization (since 1999).

Associate Editor, Optimization and Engineering (since 1999).

## **HONORS**

National award for best research paper in mathematics of a Romanian college student, 1972.

Andrew Mellon Postdoctoral Fellowship, 1982.

Old Gold Fellowship, 1984.

James Van Allen Fellowship in Natural Sciences, 1991.

Professional Engineering Publishing Award of the Editorial Board of Journal of Multi-body Dynamics, 2003.

## **MEMBERSHIP IN PROFESSIONAL ASSOCIATIONS**

Association for Computing Machinery (ACM).

Institute for Operations Research and the Management Science (INFORMS).

Mathematical Programming Society.

New York Academy of Sciences.

Society for Applied and Industrial Mathematics (SIAM).

## **PARTICIPATION IN SCIENTIFIC MEETINGS**

### **Invited lectures and contributed presentations at different professional meetings:**

The International Colloquium on the Constructive Theory of Functions (Cluj, Romania, 1973), The International Meetings on Operator Theory (Timisoara, Romania, 1977–1982), The International Seminars on Functional Analysis (Czechoslovakia, 1979, 1980, 1981), The Semester on Computational Mathematics (The International Banach Center, Warsaw, Poland, 1980), The Meeting on Numerical Solution of Nonlinear Systems of Equations (Oberwolfach, 1982), The National Meeting of SIAM (Pittsburgh, PA, 1985), The VII th International Conference on Nonlinear Analysis and Applications (Arlington, TX 1986), SIAM Meeting on Optimization (Houston, TX, 1987), First International Conference on Industrial and Applied Mathematics (Paris, France, 1987), SIAM Annual Meeting (Denver, CO, 1987), SIAM Conference on Recent Trends in Nonlinear Computational Mathematics and Mechanics (Pittsburgh, PA, 1988), SIAM Meeting on Optimization (Boston, MA, 1989), SIAM Annual Meeting (San Diego, CA, 1989), NATO Advanced Research Workshop in Real-Time Integration Methods for Mechanical System Simulation, (Snowbird, Utah, 1989), Mini-conference on Newton-Like methods for Large-Scale Nonlinear Systems (Sherwood Hills Resort, Utah, 1989), IMACS-GAMM International Symposium on Computer Arithmetic and Self-Validating Numerical Methods (Basel, Switzerland,

1989), Conference on Scientific Computation (Vienna, Austria 1990), The 1990 Conference on the Numerical Solution of Ordinary Differential Equations (Helsinki, Finland 1990), Second International Conference on Industrial and Applied Mathematics (Washington D.C., 1991), Conference on Numerical Optimization Methods in Differential Equations and Control (Raleigh, North Carolina, 1991), 16th Symposium on Operations Research (Trier, Germany 1991), International Symposium on Computer Arithmetic and Scientific Computation (Oldenburg, Germany 1991), SIAM Conference on Optimization (Chicago, 1992), SIAM 40th Anniversary Meeting (Los Angeles, 1992), International Conference on Algorithms and Complexity for Continuous Problems (Schloss Dagstuhl, Germany, 1992), US Army Research Office Workshop on Modeling and Analysis for Mechanical Systems and Algorithms for Real-Time Vehicle Simulation (Raleigh, North Carolina, 1992), The Annual Meeting of GAMM (Dresden, Germany, 1993), The Oberwolfach Meeting on ‘Differential-Algebraic Equations: Theory and Applications in Technical Simulation’ (Oberwolfach, Germany 1993), 1994 SIAM National Meeting (San Diego, California), 15th International Symposium on Mathematical Programming, (Ann Arbor, Michigan, 1994), The International Conference on Scientific Computation and Differential Equations (SCCADE 95), (Stanford, California, 1995), The International Conference on Applied Mathematical Programming and Modelling (APMOD95), (London, 1995), Third International Conference on Industrial and Applied Mathematics (ICIAM95), (Hamburg, Germany, 1995), International IMACS-GAMM Symposium on Numerical Methods and Error-bounds (Oldenburg, Germany, 1995), The 1995 AMS-SIAM Summer Seminar on Mathematics of Numerical Analysis (Park City, Utah, 1995), International Conference on Complementarity Problems (Baltimore, Maryland, 1995), Second World Congress of Nonlinear Analysts (Athens, Greece, 1996), INFORMS Meeting (Atlanta, Georgia 1996), International Workshop on Nonlinear Systems (Harburg, Germany, 1997), International Symposium on Mathematical Programming (Lausanne, Switzerland, 1997), DIMACS Workshop on Semidefinite Programming and its Applications to Large Scale Discrete Optimization (Princeton, New Jersey, 1999), International Workshop on Continuous Optimization (Rio de Janeiro, Brazil, 1999), INFORMS National Meeting (Philadelphia, 1999), International Workshop on Constrained Optimization (Sydney, Australia, 1999), INFORMS Spring 200 Meeting (Salt Lake City, 2000), International Conference on Advances in Convex Analysis and Global Optimization (Samos, Greece, 2000), 2nd Interior Point Methods Workshop, IPM2000 (Budapest, Hungary, 2000), 17th European Conference on Operational Research, EURO2000 (Budapest, Hungary, July 2000), 17th International Symposium on Mathematical Programming (Atlanta, GA, 2000), First SIAM Conference on Computational Science and Engineering (Washington DC, 2000), International Conference on Recent Advances in Computational Mathematics (ICRAM 2001, Matsuyama, Japan, 2001), INFORMS 2001 Annual Meeting (Miami Beach, Florida, 2001), Optimization and Applications (Oberwolfach, Germany, 2002), SIAM Conference on Optimization (Toronto, Canada, 2002), SIAM Annual Meeting (Montreal, Canada, 2003), V Brazilian workshop on continuous optimization, (Florianopolis, Brazil, 2004), SIAM Annual Meeting (Portland, Oregon, 2004), First Mathematical Programming Society International Conference on Continuous Optimization, ICCOPT I (Troy, New York, 2004), INFORMS Annual Meeting, (Denver, Colorado, 2004), Optimization and Applications (Oberwolfach, Germany, 2005), MOPTA05 (Windsor, ON, Canada, 2005), International Workshop on High Performance Optimization Techniques, HPOPT 2006, (Delft, The Netherlands, 2006).

**Colloquium talks at various universities and research institutes including:**

The Institute of Mathematics of the Czechoslovak Academy of Sciences (Prague, Czechoslovakia, 1979, 1981, 1982), The Technical University of Plzen, Czechoslovakia (1980), The Institute of Mathematics of the Polish Academy of Sciences (Warsaw, Poland, 1981), The Technical University of Dresden, Germany, (1981, 1991, 1994), The Technical University of Munich, Germany, (1982, 1990, 2007), The University of California at Berkeley (1982), Pennsylvania State University (University Park, PA, 1982), The State University of New York at Stony Brook (1982), The University of Michigan (Ann Arbor, MI, 1983), Indiana University (Bloomington, 1983, 1990), Syracuse University (Syracuse, NY, 1983), University of Nebraska (Lincoln, NE, 1983), Lehigh University (Bethlehem, PA, 1984), San Diego State University (San Diego, CA, 1984), Arizona State University (Phoenix, AZ, 1984, 1993), University of Texas (Arlington, TX, 1984), Argonne National Laboratory (1985, 1991, 1993, 1995, 2000, 2004), University of Wisconsin, (Madison, WI, 1985, 1995, 2004), The Univ. of Kansas (Lawrence, KS, 1984, 1986, 1991, 1995), Iowa State University (1986), University of Karlsruhe, Germany, (1987, 1988, 1993, 1994, 1995, 1996, 2000, 2006), University of Oldenburg, Germany, (1987, 1990), University of Stuttgart, Germany, (1988, 1990, 1993, 1994), University of Hamburg, Germany, (1988, 1990), University of Freiburg, Germany, (1988), University of Düsseldorf, Germany, (1988), University of Darmstadt, Germany, (1988, 1990, 1993), Konrad Zuse Zentrum (Berlin, 1988, 1990), Colorado State University (1988), Lawrence Livermore National Laboratory (1990), Rice University, Houston, Texas (1990, 1994, 1995, 1999), University of Catania, Italy (1990), University of Valencia, Spain (1990, 1996), University of Bordeaux, France (1990), University of Würzburg, Germany (1990, 1994, 2006), University of Wuppertahl, Germany (1990, 1993), University of Geneva, Switzerland (1991, 1993, 1996, 2001), University of Augsburg, Germany (1991), University of Innsbruck, Austria (1991, 2007), University of Maryland (College Park, 1991, 1994), University of Maryland Baltimore County (1991, 1994), George Mason University (1991, 1994, 1997, 1998, 2007), University of Pittsburgh (1992), Rensselaer Polytechnic Institute, Troy, NY (1992), University of Heidelberg, Germany (1993, 1994, 1995, 1996, 2002), University of Bergamo, Italy (1993, 2001, 2006, 2007), ETH Zürich, Switzerland (1993), University of Kaiserslautern, Germany (1993), INRIA, Rocquencourt, France (1993, 1994, 1995, 1996, 2004), Cornell University, Ithaca, NY (1994), University of Minnesota, Minneapolis, MN (1994), CORE, Louvain-la-Neuve, Belgium (1994, 2006), Institut Français du Pétrole, Paris, France (1995, 1996), Australian National University, Canberra, Australia (1996), University of New South Wales, Sydney, Australia (1996), University of Melbourne, Australia (1996), University La Sapienza, Rome, Italy (1996, 2000), University of Trieste, Italy (1996), University of Florence, Italy (1996, 2000), Institut Henri Poincaré, Paris, France (1996), University of Valladolid, Spain (1996), Technical University of Delft, The Netherlands (1996), Center for Mathematics and Computer Science, Amsterdam, The Netherlands (1996), National Institute for Standards and Technology (1997), Rutgers University (1997, 2000), École Nationale des Ponts et Chaussées, Paris, France (1997), University of New Mexico (1998), City University of Hong Kong (1999), Carnegie Mellon University (1999), University of Houston (1999), Federal University of Santa Catarina, Florianopolis, Brazil (2000, 2004), University of Louisiana, Lafayette (2000), Technion, Haifa, Israel (2000), University of Iowa, Iowa City (2000), National University of Singapore (Singapore, 2001), New Jersey Institute of Technology (2001), West Virginia University, Morgantown, WV (2001), Princeton University (2001), University of California at Santa Barbara (2001), McMaster University, Hamilton, Canada (2001), Tokyo Institute of Technology, Japan, (2001), Sandia National Laboratories, Albuquerque (2001), Johns Hopkins University, Baltimore, Maryland (2001), University of Penn-

sylvania, (Philadelphia, 2002), University of Padova (Italy, 2002), Institute of Mathematics of the Romanian Academy (Bucharest, Romania, 2003, 2006), INRIA-Alpes, Grenoble (France, 2004), Humboldt University (Berlin, 2004), University of Washington (Seattle, 2004), Western Washington University (Bellingham, 2004), Boeing (Seattle, 2004), Georgetown University (Washington D.C., 2004), Notre Dame University, Notre Dame, IN (2005), Florida Tech, Melbourne, FL (2005), IBM Research Center, Yorktown Heights, NY (2005), University of Central Florida, Orlando, FL (2006), University of Lecce (Italy, 2006), University of Tübingen (Germany, 2006), Georgia Southern University (2007), Loyola College (2007), Università degli Studi di Perugia (Italy, 2007), University of Ulm (Germany, 2007).

**Titles of selected talks (since 1990):**

“Real-time simulation of mechanical systems”. Invited plenary talk at The 1990 Conference on the Numerical Solution of Ordinary Differential Equations (Helsinki, Finland 1990).

“Multistep methods for solving constrained equations of motion”. Second International Conference on Industrial and Applied Mathematics (Washington D.C., 1991).

“Interior point algorithms with globally linear and locally quadratic convergence rate for nonlinear complementarity problems”. Invited talk at the Conference on Numerical Optimization Methods in Differential Equations and Control (Raleigh, North Carolina, 1991).

“Implementation of interior point methods on parallel machines”. Invited talk at the 16th Symposium on Operations Research (Trier, Germany 1991).

“Hybrid algorithms for computing zeroes of convex functions”. Invited talk at the International Symposium on Computer Arithmetic and Scientific Computation ( Oldenburg, Germany 1991).

“Polynomial complexity vs. fast local convergence for interior point methods”. SIAM Conference on Optimization (Chicago, 1992).

“Numerical integrators for real-time simulation of mechanical systems”. SIAM 40th Anniversary Meeting, Los Angeles, 1992.

“Probabilistic complexity of interior point methods”. Invited talk at the International Conference on Algorithms and Complexity for Continuous Problems (Schloss Dagstuhl, Germany, 1992).

“ On some efficient interior point algorithms for large-scale nonlinear convex programming” ORSA/TIMS National Meeting (San Francisco, 1992).

“Tangent space parameterization multibody integrators”. Invited talk at the US Army Research Office workshop on Modelling and Analysis for Mechanical Systems and Algorithms for Real-Time Vehicle Simulation (Raleigh, North Carolina, 1992).

“Numerical methods for differential-algebraic systems with application to real-time simulation of mechanical systems”. Invited plenary talk at the GAMM Annual Conference (Dresden, Germany, 1993).

“Efficient numerical integrators for constrained motion equations”. Invited talk at The Oberwolfach Meeting on Differential-Algebraic Equations: Theory and Applications in Technical Simulation (Oberwolfach, Germany, 1993).

“A geometric theory of discretization algorithms for differential-algebraic equations”. Invited talk at The Oberwolfach Meeting on General Principles of Discretization Algorithms, Theory and Applications (Oberwolfach, Germany, 1993).

“An infeasible-interior-point method for LCP”. 1994 SIAM National Meeting (San Diego, California, 1994).

“Polynomial complexity and superlinear convergence of infeasible-interior-point algorithms”, invited mini-symposium talk at the 15th International Symposium on Mathematical Programming, (Ann Arbor, Michigan, 1994).

“QSSA integrators for stiff ODEs arising in computational atmospheric chemistry”, talk at the International Conference on Scientific Computation and Differential Equations (SciCADE95), (Stanford, California, March 28–April 1, 1995).

“Infeasible-interior-point methods for linear complementarity problems”, invited talk at the international conference on Applied Mathematical Programming and Modelling (APMOD95), (London, April 3-5, 1995).

“Interior point methods for large scale image reconstruction problems”, mini-symposium talk at the Third International Conference on Industrial and Applied Mathematics (ICIAM95), (Hamburg, Germany, July 3-7, 1995).

“Self-validating methods for solving nonlinear equations”, invited talk at the International IMACS-GAMM Symposium on Numerical Methods and Error-bounds (Oldenburg, Germany, July 9-12, 1995).

“Interior-point methods for linear complementarity problems with sufficient matrices”, invited talk at the 1995 AMS-SIAM Summer Seminar on Mathematics of Numerical Analysis (Park City, Utah, 1995).

“Linear complementarity in rigid-body contact dynamics”, invited talk at the International Conference on Complementarity Problems (Baltimore, Maryland, November 1-4, 1995).

“Interior-point methods for nonlinear optimization”, invited one hour talk at The Second World Congress of Nonlinear Analysts (Athens, Greece, July 10-17, 1996).

“A superlinearly convergent primal-dual infeasible-interior-point algorithm for semidefinite programming, invited session talk at the INFORMS Fall 1996 Meeting (Atlanta, Georgia, November 3-6, 1996).

“Interior point methods for nonlinear complementarity problems”, invited talk at the International Workshop (Sommerschule) on Nonlinear Systems, Harburg, Germany, March 17–21, 1997.

“Secant methods for semismooth equations”, International Symposium on Mathematical Programming, Lausanne, Switzerland, August 25–29, 1997.

“Nonsymmetric search directions for semidefinite programming”, DIMACS Workshop on Semidefinite Programming and its Applications to Large Scale Discrete Optimization, Princeton, New Jersey, January 7–9, 1999.

“Interior point methods for semidefinite programming”, invited talk at the International Workshop on Continuous Optimization, IMPA, Rio de Janeiro, Brazil, June 21–26 1999.

“On the superlinear convergence of interior point methods”, invited session talk at the INFORMS National Meeting, Philadelphia, November 7–10, 1999.

“A Homogeneous Interior–Point Algorithm for Semidefinite Programming: Theory and Implementation”, invited talk at the International Workshop on Constrained Optimization, Sydney, Australia, December 13–17, 1999.

“Numerical Validation of Solutions of Nonlinear Complementarity Problems”, minisymposium talk at the INFORMS Spring 2000 Meeting, Salt Lake City, May 7–10, 2000.

“A General Class of Interior-Point Algorithms for Semidefinite Programming with Polynomial Complexity and Superlinear Convergence”, International Conference on Advances in Convex Analysis and Global Optimization, Samos, Greece, June 5-9, 2000.

“On a class of infeasible interior-point methods for semidefinite programming”, invited plenary talk at the 2nd Interior Point Methods Workshop, IPM2000, Budapest, Hungary, July 14–15, 2000.

“On the convergence of the iteration sequence in interior-point methods”, talk at the 17th European Conference on Operational Research, EURO2000 (Budapest, Hungary, July 16–19, 2000.

“Sensitivity analysis for linear complementarity problems via interval arithmetic”, invited minisymposium talk at the 17th International Symposium on Mathematical Programming, Atlanta, GA, August 6–11, 2000.

“Models for multi-rigid-body dynamics with contact and friction”, invited minisymposium talk at the First SIAM Conference on Computational Science and Engineering, Washington DC, September 21–24, 2000.

“On the Newton-Kantorovich Theorem”, invited talk at the International Conference on Recent Advances in Computational Mathematics (ICRAM 2001), Matsuyama, Japan, October 10-13, 2001.

“ A superlinearly convergent interior point method for LCP based on a large neighborhood of the central path”, invited minisymposium talk at the INFORMS 2001 Annual Meeting, Miami Beach, Florida, November 4-7, 2001.

“An interior point method in the large neighborhood of the central path”, invited talk at the workshop on Optimization and Applications, Oberwolfach, January 13-19, 2002.

“The Kantorovich Theorem and Nonlinear Programming”, invited minisymposium talk at SIAM Conference on Optimization, Toronto, Canada, May 20-22, 2002.

“Higher Order Methods for Multibody Systems with Contact and Friction”, invited minisymposium talk at the SIAM Annual Meeting Montreal, Canada, June 16-20, 2003.

“Predictor-corrector methods for sufficient linear complementarity problems in a wide neighborhood of the central path”, invited talk at the V Brazilian workshop on continuous optimization, Florianopolis, Brazil, March 22-25, 2004.

“Linearly implicit time-stepping methods for multibody contact dynamics”, invited minisymposium talk at the SIAM Annual Meeting, Portland, Oregon, July 12-16, 2004.

“A corrector-predictor method for sufficient linear complementarity problems in a wide neighborhood of the central path”, invited session talk at the First Mathematical Programming Society. International Conference on Continuous Optimization., ICCOPT I., Troy, NY, August 2-4, 2004.

“Revenue optimization via alternating linear programming”, invited minisymposium talk at the INFORMS Annual Meeting, Denver, Colorado, October 24-27, 2004.

“Interior point methods for linear complementarity problems”, invited talk at the workshop on Optimization and Applications, Oberwolfach, January 9-15, 2005.

“Interior point methods in large neighborhoods of the central path”, invited talk at the conference on Modeling & Optimization: Theory and Applications (MOPTA05), Windsor, ON, Canada, July 25 - 27, 2005.

“Primal-dual affine scaling methods for linear complementarity problems”, invited talk at the 9th International Workshop on High Performance Optimization Techniques (HPOPT 2006), Delft, The Netherlands, June 15 -16, 2006.

“Interior point methods for complementarity problems”, invited plenary talk at the Joint EUROPT-OOMS Meeting, Prague, Czech Republic, July 4-7, 2007.

“Interior point methods for linear complementarity problems”, invited minisymposium talk at the 6th International Congress on Industrial and Applied Mathematics (ICIAM07), Zurich, Switzerland, July 16-20, 2007.

## TEACHING

Developed a new regular course, “Parallel and Vector Algorithms in Scientific Computing” (taught initially as a topics course in 1988).

**Regular graduate courses:** “Real Analysis”, “Complex Analysis”, “Numerical Solution of Partial Differential Equations”, “Optimization Techniques”, “Numerical Analysis: Nonlinear Equations and Approximation Theory”, “Numerical Analysis: Differential Equations and Linear Algebra”, “Design and Analysis of Algorithms”, “Nonlinear Programming”, “Optimization Algorithms”, “Matrix Theory”.

**Topics courses:** “Numerical Analysis of Parameterized Nonlinear Equations”, “Numerical Solution of Stiff Ordinary Differential Equations and Mixed Differential-Algebraic Equations”, “Interior Point Methods”.

**Short Summer courses:** “Interior Point Methods for Semidefinite Programming”, mini-course DEA, University of Paris I (Sorbonne), 1997.

“Semidefinite Programming and Applications”, Cortona, Italy, 2001.

“An Introduction to Semidefinite Programming”, University of Rome (La Sapienza), 2002.

“Interior Point Methods”, University of Karlsruhe, Germany, 2006.

“Interior Point Methods and Applications”, University of Bergamo, Italy, 2007.

## Former Ph.D. Students:

1. Prapasri Asawakun (1989): Application of conjugate directions and quasi-Newton methods to parallel unconstrained optimization. (Present employment: School of Mathematics, Institute of Science Suranaree University of Technology, THAILAND)
2. Jeng Yen (1990): Numerical methods for constrained equations of motion in mechanical systems dynamics. (Directed jointly with E. J. Haug from Mechanical Engineering). Present employment: Jet Propulsion Laboratory, California Institute of Technology.
3. Hosae Lee (1991): Multigrid methods for solving integral equations. (Present employment: Dubai University College)
4. Qing Qing Fu (1992): Numerical solution of mixed differential algebraic systems.
5. Yixun Shi (1992): Iterative methods in nonlinear programming. (Present employment: Bloomsberg University).
6. Jun Ji (1993): Superlinear algorithms for LP and LCP problems. (Present employment: Kennesaw State University )
7. Goran Lesaja (1996): Interior point methods for  $P_*$ -complementarity problems. (Present employment: Georgia Southern University).

8. Mihai Anitescu (1997): Modeling rigid-multibody dynamics with contacts and friction. James Wilkinson Postdoctoral Fellow at Argonne National Laboratory. (Present employment: Argonne National Laboratory ).
9. Dan Coroian (1997): Numerical methods for simulation and optimization of mechanical systems. (Present employment: University of Indiana, Purdue).
10. Adrian Sandu (1997): Numerical aspects of air quality models. (Directed jointly with Greg Carmichael from Chemical Engineering). Postdoctoral Fellow at the Courant Institute of Mathematical Sciences. (Present employment: Virginia Tech).
11. Rongqin Sheng (1997): Interior-point methods for semidefinite programming. Postdoctoral Fellow at Argonne National Laboratory. (Present employment: Lucent Technologies).
12. Valeriu Damian-Iordache CS (1998): Software tools for air pollution models. (Present employment: Glaxo Smith Kline).
13. Xing Liu (2005): Interior point methods and applications (Present employment: NewDay Financial).
14. Bogdan Gavrea (2006): Multibody dynamics with contact and friction (Present employment: University of Pennsylvania).

**Former M.S. Students:**

1. Horea Pop CS (1997): Contributions to coding theory. (Present employment: Occidental College, CA).
2. Nathan Brixius CS (1998): Truss topology design. (Present employment: Microsoft).

**Present Ph.D. Students:**

1. Dan Wang, PDE constrained optimization.
2. Cosmin Petra, Complementarity Problems.
3. Adrian Vancea, Interior Point Methods.
4. Shiming Yang, Nolinear Optimization.

**SERVICE**

*Department of Mathematics, University of Iowa:* Hiring Committee, member (1988–89, 1992–1993, 1996–1997); Graduate Committee, member (1989–1997); M.S. and Ph.D. Comprehensive Examination Committees, member (1985–1997).

*Department of Computer Science, University of Iowa:* Research Committee, head (1993–1996).

*Department of Mathematics and Statistics, University of Maryland Baltimore County:* Outreach Committee, member(1998-2000), Applied Mathematics Colloquium Committee, member (2000-2001), Ph.D. Comprehensive Examination Committees, member (1999–2004), General Affairs

Committee, member (2000-2001), Graduate Committee, member (2001-2007), Hiring Committee, member (2001-2002, 2004-2006) .

*University of Maryland Baltimore County:* MARCU\* Steering Committee (1998-2007).

*University of Iowa:* Internal Review Committee for the Department of Statistics and Actuarial Science (1996), Advisory Committee of the High Speed Computing Facility, member (1987-1997), Vice President for Research Advisory Committee in the Physical and Mathematical Sciences, member (1994-1995).

*General:* Reviewer for the National Science Foundation 1988-present; Reviewer for Department of Energy; Reviewer for different professional journals including SIAM Journal on Numerical Analysis, Mathematics of Computation, IMA Journal on Applied Mathematics, Aequationes Mathematicae, SIAM Journal on Optimization, Mathematical Programming, Mathematics of Operations Research, Optimization Methods and Software, Applied Math. Letters, Operations Research, Applied Numerical Math., OR Letters, COAP, JCAM, etc.

## HISTORY OF RESEARCH SUPPORT

- 1985-87 NSF Grant DMS-8503365 for “Numerical methods for some classes of differential and integral equations” ( with K. Atkinson and A. Bogomolny, \$ 83,400 ).
- 1987-96 Center for Simulation and Design Optimization of Mechanical Systems, an NSF/ARMY/NASA-sponsored Industry/University Cooperative Research Center.
- 1990 Research Grant for “Study of numerical methods for solving mixed differential algebraic systems of equations” from Deutscher Akademischer Austauschdienst (DAAD) (2,700 German Marks, May 1990).
- 1991 Faculty Research Participation for “Numerical solution of differential algebraic equations using automatically evaluated implicit derivatives”, Argonne National Laboratory (\$10,800, Summer 1991).
- 1992 Interdisciplinary Research Grant from the Institute for Advanced Studies, University of Iowa (\$ 5,000, Summer 1992).
- 1992-93 Cooperative Research and Development Agreement (CRADA) for “Automatic Differentiation on Mechanical System Simulation” (with A. Griewank (ANL) and J. Yen (CADSI)), U.S. Department of Energy (\$130,000).
- 1993 Research Grant from the Swiss National Science Foundation ( 24,000 Swiss Francs).
- 1994-95 Research Grant for “Research and Development of a Prototype Parallel Global Scale Tropospheric Chemistry Model”, (with Gregory R. Carmichael), Iowa Department of Commerce, Center for Global and Regional Environmental Research. (\$15,000).
- 1994-97 NSF Grant for “Interior point methods for linear and nonlinear programming”, Grant No. DMS-9305760 (\$74,000).
- 1994-97 NSF equipment grant for “Experimental Parallel and Distributed Computing Research at the University of Iowa” (with Maria Paola Bonacina, Jim Cremer, Sukumar Ghosh, Ted Herman, and Hantao Zhang), Grant No. CDA-9320427 (\$130,000 from NSF + \$110,000 from UI ).

- 1994–97 DOE Grant for “Evaluation of Ultraviolet Radiation, Ozone and Aerosol Interactions in the Troposphere using Automatic Differentiation” (with Gregory R. Carmichael), Grant No. DE-FG02-94ER61855 (\$353,082).
- 1995–98 NSF Instrumentation and Laboratory Improvement grant for “Parallel Programming Consortium: Enabling Education in Parallel Computing at an Undergraduate Level” (with Judith Brown and Teo Rus), Grant No. DUE-9551183 (\$225,000).
- 1996–99 NSF Instrumentation grant for “Instrumentation for Virtual Environments: Integrating Dynamics and Real-time Interactivity” (with Jim Cremer, Joe Kearney, and Jon Kuhl), Grant No. CDA-9529518 (\$200,000 from NSF + \$133,000 from UI).
- 1999–2001 NSF Grant for “Interior point methods for semidefinite programming”, Grant No. DMS-9996154 (\$90,705).
- 2000-01 NSF Grant for ”An NSF Workshop on Mathematics and Robotics”, Grant No. DMS-0085339 (\$36,999 ).
- 2001 United Technologies Research Center Grant for ”Exploring use of state-of-the-art optimization techniques”, (\$11,000 ).
- 2002-05 NSF Grant for “Scientific Computing Research Environments for the Mathematical Sciences - SCREMS” (with Jonathan Bell, Matthias K. Gobbert, and Madhu V. Nayakkankuppam), Grant No. 0215373, (\$75,000).
- 2002-06 NSF Grant for “Computer Science, Engineering and Mathematics Scholarships - CSEMS” (with Taryn M. Bayles, Claudia Morrel, Anne M. Spence, and Valeri P. Scott), Grant No. 0220628, (\$396,000).
- 2002-06 NSF Grant for “Focused Research Collaborative Proposal: Differential Algebraic Inequalities and their Applications in Engineering” (with Jeff Trinkle), Grant No. 0139701, (\$437,514).
- 2003-04 Agensmith Grant for ”Using Interior Point Method Technology for Revenue Optimization”, (\$6000).
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