

Shu-Cherng Fang

Curriculum Vitae

**Industrial Engineering and Operations Research
North Carolina State University
Box 7906
Raleigh, NC 27695-7906**

August, 2001

PROFILE

Professor Shu-Cherng Fang holds a joint appointment in Industrial Engineering and Operations Research at NC State. He was *Director of Operations Research* from 1990 to 1995 and is now the *Walter Clark Professor and Director of Graduate Programs* of Industrial Engineering. His research interests include variational inequalities, large-scale linear and nonlinear programming, entropy optimization, neurocomputing, and fuzzy systems theory, with applications in building intelligent human-machine decision support systems for manufacturing and telecommunications.

Professor Fang received his Bachelor's degree from The National Tsing Hua University located in Taiwan, R.O.C. (1974), his Master's degree from The Johns Hopkins University (1977), and his PhD degree from Northwestern University (1979). Before he joined NC State as *Professor of Operations Research and Industrial Engineering* in 1988, Dr. Fang had been *Assistant Professor* at the University of Maryland, *Distinguished Member of Technical Staff* at AT&T Engineering Research Center, *Supervisor* at AT&T Bell Laboratories, and *Department Manager* at AT&T Corporate Headquarters.

Dr. Fang's dissertation (under the supervision of Professor E. L. Peterson) defines a class of important problems, called *Generalized Variational Inequalities*, which was extensively studied and extended by many researchers in the 1980's and recently has been proven to be equivalent to the generalized *Wiener-Hopf equations*. Researchers are currently building a framework based on the generalized variational inequalities to unify the theories of nonlinear programming. This pioneering work has won him international recognition. He has been a member of the most prestigious *International Advisory Committee* of the *International Symposium on Mathematical Programming* since 1994, and key speaker in many international conferences.

While he was associated with the AT&T Engineering Research Center located in Princeton, New Jersey, Dr. Fang modeled the lightguide cable manufacturing process and designed a computer aided manufacturing system named LITES (Lightguide Integrated TEchnology System). This work has results in millions of dollars of savings per year for AT&T. For the contribution, in 1984, he was awarded the *AT&T Technical Achievement Award*, the highest recognition given to a member of technical staff in the company.

While working at AT&T Bell Laboratories in Holmdel, New Jersey, Dr. Fang and his group built a computer aided telecommunication network design system for inter-node facility network planning. Using Karmarkar's algorithm, the system has the capability to handle problems with millions of variables and hundred thousands of constraints. It is routinely used to assist decision makers in the management of AT&T's \$18.6 billion network. The work was cited as one of the *Hottest Hits* by *Bell Labs News* in 1986, and the group was awarded the *AT&T End-User's Eagle Award* in 1987.

In the early days of his employment at NC State, with the support from AT&T Advanced Decision Support Systems, the Cray Research Institute, the North Carolina Supercomputing Center, and the National Science Council of the Republic of China in Taiwan, Professor Fang's research focused on developing the theory and algorithms of the *entropic perturbation approach* to solve large scale linear and nonlinear optimization problems in finite dimensional as well as infinite dimensional spaces. He published (with Dr. Sarat

Puthenpura) a graduate textbook entitled *Linear Optimization and Extensions: Theory and Algorithms* by Prentice Hall in 1993. This is the first graduate textbook which integrates the well known Simplex Method and the newly developed Interior Point Methods on one platform. The book has been adopted by many universities and research programs around the world. A Chinese version of the book was published by Science Press in 1994. His research interest in the theory of Entropy Optimization and its industrial applications also resulted in a research book entitled *Entropy Optimization and Mathematical Programming* (with Drs. J. R. Rajasekera and H. -S. Jacob Tsao) published by the Kluwer Academic Publishers in 1997.

Since 1993, Professor Fang has expanded his research to include the area of fuzzy systems and neural networks for intelligent human-machine decision making. He is currently working with a research team (including Professors Gordon Berstreser, Russell King, Henry Nuttle and James Wilson) on building intelligent manufacturing and management systems for US textile and furniture industries. This work is sponsored by the National Textile Center, Furniture Foundation, and Sandia National Laboratories. Advanced fuzzy and neural technologies have been developed to permit the construction of decision surface models for the textile and apparel industries. Professor Fang is also directing the *Fuzzy and Neural Group* at NC State (<http://www.ie.ncsu.edu/fangroup>). Members of the group are exploring the theoretical frontiers of fuzzy systems and neural technologies as well as working on industrial projects sponsored by IBM, Nortel, Fruit of the Loom, and SAS. He is currently preparing a new book on *Fuzzy Optimization and Decision Making with Industrial Applications* with Professor H.-F. Wang for Kluwer Academic Publishers. A Chinese version of the book was published by Science Press in 1997. For his leadership in the field, Professor Fang was named the *Editor-in-Chief* of *Fuzzy Optimization and Decision Making* in Fall 2000. The inaugural issues of this international journal will be published by Kluwer Academic Publishers in Fall 2001.

Professor Fang has published more than one hundred refereed journal articles and numerous proceeding articles and industrial technical reports. He is currently serving in the editorial board of *Optimization, Journal of Global Optimization, International Journal of Operations and Quantitative Management, International Journal of Nonlinear Modeling in Science and Engineering* and *Journal of the Chinese Institute of Industrial Engineers*. He also served as *President* of the *Association of Chairpersons of Operations Research Departments (ACORD)* in 1992-93. For his distinguished scholarly achievement, Professor Fang was awarded the *NC State Alumni Outstanding Research Award* in 1998. He was also awarded the *Honorary University Professorship* by the Northeastern University located in Shenyang, China, in March, 1999, and the *Distinguished Contribution Award* by the Science Division of the Taipei Economics and Cultural Office in US in 1999.

Dr. Fang believes that *interdisciplinary research, industrial participation, and international collaboration* are keys to future success for any academic program. He is the *International Liaison* of the College of Engineering and served as *Chair* of the *University Committee on International Programs* in 1995-96. He also served as the *Visiting University Examiner* of the Chinese University of Hong Kong in 1995-2000. Dr. Fang was appointed the *State Representative of Information Infrastructure* in 1995 and *Member of the North Carolina - Shanghai Taskforce* in 1999, both by Governor James B. Hunt of the State of North Carolina. Dr. Fang received the *IBM Global Partnership Award* for his contribution in establishing international collaboration programs with IBM - China in 1998. He received the *Advocacy Award* from

the Association for the Concerns of African-American Graduate Students in April 2001 for his achievement in promoting graduate education for African-Americans in North Carolina State University. He also received the Jackson Rigney International Service Award from the N C State International Studies Honor Society in May 2001 for his outstanding research and scholarship through international collaboration.

Very recently, Professor Fang becomes the seventeenth recipient of the R. J. Reynolds Award for Excellence in Teaching, Research, and Extension that was established by R. J. Reynolds Company through the NC State Engineering Foundation to honor a member of the engineering faculty who has demonstrated superiority in several areas of activity that relate to the University's three-fold mission of teaching, research, and extension.

PERSONAL DATA

Name: Shu-Cherng Fang
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E-mail: fang@eos.ncsu.edu
URL: <http://www.ie.ncsu.edu/fangroup>

EDUCATION

1977 - 79: Northwestern University, Evanston, Illinois
Ph.D. Industrial Engineering and Management Sciences
1976 - 77: Johns Hopkins University, Baltimore, Maryland
M.S. Mathematics
1970 - 74: National Tsing Hua University, Taiwan, R.O.C.
B.S. Mathematics

PRESENT POSITIONS

1999 – present: Director of Graduate Programs in Industrial Engineering
North Carolina State University, Raleigh, North Carolina
1999 - present: Honorary University Professor
Northeastern University, Shenyang, P. R. China
1996 - present: Walter Clark Professor of Industrial Engineering
North Carolina State University, Raleigh, North Carolina
1995 - present: State Representative and Advisor of Information
Technology. Appointed by Governor James B. Hunt, Jr. of
the State of North Carolina.
1993 - present: Professor of Textile Technology Management
North Carolina State University, Raleigh, North Carolina
1988 - present: Professor of Industrial Engineering and Operations
Research
North Carolina State University, Raleigh, North Carolina

RESEARCH INTERESTS

- ◆ Large scale linear and nonlinear optimization
- ◆ Telecommunications network design and planning
- ◆ Computer aided manufacturing systems
- ◆ Fuzzy systems and decision making
- ◆ Intelligent human-machine decision support systems
- ◆ Information theoretic analysis
- ◆ Factory data networking
- ◆ Global information infrastructure

CONSULTING

- ◆ AT&T - Advanced Decision Support Systems
- ◆ Research Triangle Institute
- ◆ IBM – Software Solutions
- ◆ IBM - Research Triangle Park
- ◆ Chung-Hua Telecommunications of Taiwan, R.O.C.
- ◆ Industrial Technology Research Institute of Taiwan, R.O.C.
- ◆ Glen Raven Mills Inc.
- ◆ Triangle Laboratories Inc.
- ◆ Nucor Bearing Products
- ◆ Glaxo Wellcome
- ◆ Fruit of the Loom
- ◆ Nortel – Wireless Division
- ◆ Sandia National Laboratory
- ◆ Chinese University of Hong Kong
- ◆ Hong Kong University of Science and Technology
- ◆ SAS Institute, Inc.

EXPERIENCE

- 1990 - 1995:
2000 (Spring) Director of the Operations Research Program
North Carolina State University, Raleigh, NC.
- 1999 (Summer): Distinguished Visiting Professor
Department of Mathematics, Burapha University, Thailand
Sponsored by the Royal Thai Government, Ministry of
University Affairs, Thailand.
- 1999 (Summer): Distinguished Technical Advisor
ATM Broadband Networks, Chung-Hua
Telecommunications Laboratories, Taiwan, R.O.C.
- 1997 (Summer): Distinguished Invited Lectureship
Department of Industrial Engineering, National Tsing Hua
University, Hsinchu, Taiwan, R.O.C.
Sponsored by the National Science Council of Taiwan,
R.O.C.
- 1996 (Summer): Distinguished Visiting Professor
Shanghai University in Shanghai, Jiao-tong University in
Xi'an, Huazhong University of Science and Technology in
Wuhan, Northeastern University in Shenyang
Sponsored by the National Natural Science Foundation of
China.
- 1995 (Summer): Visiting Professor
Graduate School of International Management,
International University of Japan, Niigata, Japan
Sponsored by the Ministry of Education and International
Education Foundation of Japan.
- 1995 (Summer): Distinguished Invited Lectureship
Department of Industrial Engineering, National Tsing Hua
University, Hsinchu, Taiwan, R.O.C.
Sponsored by the National Science Council of Taiwan,
R.O.C.
- 1994 (Summer): Visiting Professor
Institute of Applied Mathematics, National Cheng Kung
University, Taiwan, R.O.C.
Sponsored by the National Science Council of Taiwan,
R.O.C.

- 1994 (Summer): Distinguished Visiting Professor
Northeastern University in Shenyang, Tsing Hua University in Beijing, Academia Sinica in Beijing, Nankai University in Tianjin, Huazhong University of Science and Technology in Wuhan, Fudan University in Shanghai, Shanghai University
Sponsored by the National Natural Science Foundation and the Ministry of Metallurgical Industry of China.
- 1992 (Fall): Visiting Professor
Department of Industrial Engineering, National Tsing Hua University, Hsinchu, Taiwan, R.O.C.
Sponsored by the National Science Council of Taiwan, R.O.C.
- 1992 (Summer): Visiting Professor
Graduate School of International Management, International University of Japan, Niigata, Japan
Sponsored by the International Education Foundation of Japan.
- 1989 (Summer): Visiting Technical Advisor
Telecommunications Network Planning Department, Telecommunications Laboratories, Taiwan, R.O.C.
Sponsored by the Ministry of Transportation and Communications.
- 1988 (Winter): Visiting Expert
Mechanical Engineering Laboratory, Industrial Technology Research Institute, Taiwan, R.O.C.
Sponsored by the Ministry of Economical Affairs.
- 1987 - 88: Supervisor
Integrated Network Design Department, AT&T Bell Laboratories, Holmdel, New Jersey
- ◆ Supervising members of technical staff to conduct R/D projects for AT&T domestic telecommunications network planning.
 - ◆ Exploited advanced mathematical programming techniques and parallel mini-supercomputer capabilities to solve very large scale network optimization problems.

- ◆ Successfully built the Inter-city Facility Planning (IFP) system for AT&T domestic network planners that led to the 1988 EUO Eagle Award for the group.

1986 - 87:

Department Manager
Manufacturing Information Network Management
Department, AT&T Corporate Headquarters, Berkeley
Heights, New Jersey

- ◆ Chief architecture in designing and engineering integrated data networking capabilities for 22 AT&T domestic and overseas factories.
- ◆ Co-chair of AT&T Factory Data Networking Steering Committee.
- ◆ Planning, reviewing and monitoring AT&T Bell Laboratories research projects and coordinating AT&T Information Systems product development for computer integrated manufacturing.
- ◆ AT&T representative for MAP-Fiber Optics Special Interest Group.
- ◆ Special Honor: 1987 AT&T Corporate Headquarters Special Merit Award.

1985 - 86:

Distinguished Member of Technical Staff
Transmission Network Design Department, AT&T Bell
Laboratories, Holmdel, New Jersey

- ◆ Designing and developing computer aided planning systems for AT&T Communications network planners to automate the network planning processes.
- ◆ Successfully designed and implemented a computerized network facility capacity planning system that solves AT&T nationwide transmission network plans with one million variables and four hundred thousand constraints via a modified Karmarkar's algorithm, this work was cited as the *Hottest Hits of Bell Laboratories* by Bell Lab News.
- ◆ Special Honor: 1986 Bell Laboratories Exceptional Contribution Award.

1980 - 85

Senior Member of Research Staff
Engineering Research Center, AT&T Technologies,
Princeton, New Jersey

- ◆ Modeling and controlling various advanced manufacturing technologies, designing and developing computer aided manufacturing systems.
- ◆ Designed and implemented a computer aided manufacturing system to automate the optical fiber shop at AT&T Atlanta factory; the system (LITES) selects the most economic way to build multi-mode, single-mode, and underseas cable systems; it saved AT&T 12 million dollars per year.
- ◆ Developed a computer aided material slitting system for the cable slitting process at AT&T Baltimore, Hawthorn and Omaha Works.
- ◆ Developed a VLSI memory chip repair strategy for the 64K DRAM product line at AT&T Merrimack Valley and Oklahoma Works.
- ◆ Developed a system to detect electrical shorts and opens for the printed circuit board product line at AT&T Richmond and North Carolina Works.
- ◆ Special Honor : 1984 AT&T Technical Achievement Award.

1979 - 80:

Assistant Professor
Department of Mathematics, University of Maryland
Baltimore County, Maryland

- ◆ Taught graduate and undergraduate courses on Linear Programming & Network Flows, Integer & Dynamic Programming and Mathematical Modeling.

1974 - 76:

Second Lieutenant Platoon Leader
Chinese Army Transportation Troops, Taiwan, R.O.C.

HONORS

- 2001: R. J. Reynolds Award for Excellency in Teaching, Research, and Extension, College of Engineering, NC State University
- 2001: Jackson Rigney International Service Award, International Studies Honor Society, N C State University
- 2001: African-American Advocacy Award, Association for the Concerns of African-American Graduate Students, NC State University
- 1999: Honorary University Professorship, Northeastern University, China
- 1999: Distinguished Contribution Award, Science Division, Taipei Economic and Cultural Representative Office in United States
- 1998: IBM Global Partnership Award, IBM University Relations
- 1998: NC State Outstanding Research Award, University Alumni Association
- 1997: Director's Partnership Award, National Textile Center
- 1996: Walter Clark Professorship, NC State University
- 1990-95: Cray Research Award (6 times) , Cray Research Inc.
- 1990: Fellow of the North Carolina Supercomputing Center
- 1987: AT&T Corporate Headquarters Special Merit Award
- 1986: AT&T Bell Laboratories Exceptional Contribution Award
- 1984: AT&T Technologies Technical Achievement Award
- 1979: Faculty Summer Research Grant, University of Maryland
- 1978: Murphy Fellow, Northwestern University
- 1977: Hopkins Fellow, Johns Hopkins University
- 1976: Distinguished Service Award, Chinese Army (Taiwan), ROC

Who's Who In the World

Who's Who In America

Who's Who In The East

Who's Who In Frontier Science and Technology

Who's Who In Science and Engineering

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

Present:	Senior Member, IIE
Present:	Full Member, INFORMS
Present:	Member, Tau Beta Pi
Present:	Member, Omega Rho
Present:	Member, Sigma Phi
Present:	Member, Sigma Xi
1987:	ORSA Nicholson Prize Committee
1990 – 91:	Secretary and Treasurer, the Association of Chairpersons of Operations Research Departments (ACORD) of INFORMS
1991 – 92:	Vice President and President-Elect, the Association of Chairpersons of Operations Research Departments (ACORD) of INFORMS
1992 – 93:	President, the Association of Chairpersons of Operations Research Departments (ACORD) of INFORMS
1992 – 94:	International Advisory Committee, the 15th International Symposium on Mathematical Programming, Ann Arbor, Michigan, U.S.A., August 1994
1992 – present:	Specialist Register, Hong Kong Research Grants Council
1992 – present:	Accessor, Hong Kong University and Polytechnic Grants Committee
1993:	Organizing Committee, Sino-American International Technology Transfer Symposium, Taipei, Taiwan and Shenyang, China, May, 1993
1995 – 97:	International Advisory Committee, the 16th International Symposium on Mathematical Programming, Lausanne, Switzerland, August, 1997
1996 – 2000:	University Visiting Examiner, Chinese University of Hong Kong

- 1997: Invited Tutorial, INFORMS National Meeting, San Diego, U.S.A., April, 1997
- 1998: Keynote Speaker, International Conference on Nonlinear Programming and Variational Inequalities, Hong Kong, December, 1998
- 1999: International Advisory Committee, The Second International Conference on Operations and Quantitative Management, Ahmedabad, India, January, 1999
- 1999: International Advisory Committee, The Eighth International Fuzzy Systems Association World Congress, Taiwan, August, 1999
- 1999: Area Chair, The Eighth International Fuzzy Systems Association World Congress, Taiwan, August, 1999
- 1999: Invited Key Speaker, International Conference on Optimization and Numerical Algebra, Nanjing, China, September, 1999
- 1999: International Advisory Committee, International Workshop on Semi-infinite Programming, Alicante, Spain, September, 1999
- 2000: External Review Committee, National Tsing Hua University, Hsinchu, Taiwan, ROC.
- 2000: International Advisory Committee, The fifth International Conference on Optimization Techniques and Applications (ICOTA'2000), Hong Kong, 2001.
- 2000: Organizing Committee, The Eighth Bellman Continuum, the International Workshop on Intelligent Systems Resolutions, Taiwan, ROC, December, 2000.
- 2000: Panel Chair, The Eighth Bellman Continuum, the International Workshop on Intelligent Systems Resolutions, Taiwan, ROC, December, 2000.
- 2000: International Advisory Committee, The fifth Annual International Conference on Industrial Engineering – Theory, Applications and Practice, Taiwan, ROC, December, 2000.

- 2001: Keynote Speaker, International Conference on Optimization and Optimal Control, Taiwan, June 1-4, 2001.
- 2001: Advisory Committee, The International Conference on Optimization and Industry, Queensland, Australia, July 1-6, 2001.
- 2001: Keynote Speaker, The Fifth International Conference on Optimization, Hong Kong, December 15-17, 2001.
- 2002: Organizing Committee, The 9th Bellman Continuum, Beijing, China, July 24-27, 2002.
- 2002: Program Committee, International Conference on Fuzzy Systems and Knowledge Discovery, Singapore, Nov 18-21, 2002.

EDITORIAL SERVICE

- 1989 - present: Editor
Journal of Chinese Institute of Industrial Engineers.
- 1994 - present: Area Editor
International Journal of Operations and Quantitative Management.
- 1995 - present: Editorial Board
Optimization.
- 2000 – present: Editorial Board
Journal of Global Optimization
- 2000 – present: Editorial Board
International Journal of Nonlinear Modeling in Sciences and Engineering
- 2000 – present: Editor-in-Chief
Fuzzy Optimization and Decision Making
- 1999: Guest Editor, (with Chiang Kao)
International Journal of Operations and Quantitative Management, Special Issue on *Quantitative Management Techniques and Applications in Taiwan*.
- 2000: Guest Editor, (with Chung-Yee Lee)
Journal of the Chinese Institute of Industrial Engineers, Special Issue on Soft-computing for Industrial Engineering
- 2001: Guest Editor, (with Carlton Scott)
Annals of Operations Research, Special Issue on *Geometric Programming, Entropy Optimization and Generalizations*.
- 1980 - present: Referee/Reviewer
- ◆ Mathematical Reviews
 - ◆ Mathematical Programming
 - ◆ Journal of Optimization Theory and Applications
 - ◆ Optimization
 - ◆ Computational Optimization and Applications
 - ◆ European Journal of Operational Research
 - ◆ Annals of Operations Research
 - ◆ OR Letters
 - ◆ Opsearch
 - ◆ IIE Transactions

- ◆ Journal of Chinese Institute of Industrial Engineers
- ◆ IEEE - Automatic Control
- ◆ IEEE – Systems, Man, and Cybernetics
- ◆ Networks
- ◆ Transportation Science
- ◆ International Journal of Operations and Quantitative Management
- ◆ International Journal of Production Economics
- ◆ Production and Operations Management
- ◆ International Journal of General Systems
- ◆ Fuzzy Sets and Systems
- ◆ Journal of the Chinese Fuzzy Systems Association
- ◆ Indian Journal of Pure and Applied Mathematics
- ◆ Mathematics Today
- ◆ Mathematical and Computer Modelling
- ◆ Applied Mathematics Letters
- ◆ Optimal Control Applications and Methods
- ◆ Computers and Operations Research
- ◆ Computers and Industrial Engineering
- ◆ Computers and Mathematics with Applications

RESEARCH GRANTS AND ACTIVE PROPOSALS

1. *General Network Equilibrium Analysis*
Faculty Summer Research Grant, University of Maryland, Summer 1980. (\$2,500)
2. *Stochastic Linear Programming via Kalman Filter and Affine Scaling*
AT&T Advanced Decision Support Systems, 1988-89. (\$45,000)
3. *Large Scale Stochastic Linear Programming*
AT&T Advanced Decision Support Systems, 1989-90. (\$45,000)
4. *Promising New Methods for Large Scale Linear Programming and Linear Complementarity Problems*
North Carolina Supercomputing Center and Cray Research Grant, 1990-91. (\$47,000 equiv.)
5. *Textile Production, Capacity, and Shop-Floor Scheduling Problems*
Glen Raven Mills Inc., 1990-93. (\$60,000)
6. *Testing Flow Analysis and Optimal Scheduling*
Triangle Laboratories Inc., 1991-92. (\$23,000)
7. *The Inference of Probability and Mass Distributions via Entropy Optimization with Generalized Geometric Programming*
North Carolina Supercomputing Center and Cray Research Grant, 1991-92. (\$47,000 equiv.)
8. *Advances in Large-scale Linear Programming via the Unification, Generalization, and Extension of Interior-point Methods*
North Carolina Supercomputing Center and Cray Research Grant, 1992-93. (\$47,000 equiv.)
9. *Analysis and Modeling of Actions and Interactions of Textile Industry*
National Textile Center, U.S. Department of Commerce, 1992-95. (\$979,978)
10. *Large Scale Linear Programming via Interior-point Methods*
National Science Council of Taiwan, R.O.C., 1992-93. (\$30,000)
11. *An Interior-point Approach to Solving Semi-infinite Linear Programming Problems*
North Carolina Supercomputing Center and Cray Research Grant, 1993-94. (\$47,000 equiv.)
12. *Fuzzy Linear Programming*
North Carolina Supercomputing Center and Cray Research Grant, 1994-95. (\$47,000 equiv.)

13. *Pharmaceutic Production Planning*
Burroughs Wellcome, 1994-95. (\$23,000)
14. *Workforce Cyclic Scheduling*
Nucor Bearing Products, 1994-95. (\$14,000)
15. *Fuzzy Optimization for Textile Industries*
North Carolina Supercomputing Center and Cray Research Grant, 1995-96.
(\$47,000 equiv.)
16. *Fuzzy and Neural Technologies for Wireless Telecommunication Products Manufacturing*
Nortel, 1995-97. (\$45,000)
17. *Intelligent Manufacturing and Management Systems for an Agile U.S. Softgoods Complex*
National Textile Center, U.S. Department of Commerce, 1995-98. (\$1,014,577)
18. *Natural Language Research and Development*
IBM Research Triangle Park, 1996-97. (\$25,000)
19. *Supply Chain Modeling and Analysis*
Fruit of the Loom, 1996-97. (\$17,500)
20. *Softgoods Supply Chain Modeling and Analysis*
Sandia National Laboratories, 1996-98. (\$336,852)
21. *International O-O Technology Research and Development*
IBM SWS-AE, 1997-98. (\$60,000)
22. *Integrated Supply Chain Analysis and Decision Support*
National Textile Center, U.S. Dept. of Commerce, 1998-2000. (\$579,738)
23. *Intelligent Manufacturing System for Wave Soldering Operations*
Nortel, 1998-99. (\$18,000)
24. *International Collaboration Research on New Computing Technologies*
IBM, 1998-2000. (\$50,000)
25. *Decision Support Tools for Furniture Supply Chain Management*
Furniture Foundation, 1999-2001. (\$99,674)
26. *Graduate Industrial Traineeship on Supply Chain Management*
SAS Institute, Inc., 2001-2002. (\$96,736)
27. *Business-to-Business Collaboration in a Softgoods E - Supply Chain*
National Textile Center, U.S. Department of Commerce, 2001-2002. (\$189,415).

28. Integrated Furniture Supply Chain Logistics
Furniture Foundation, 2001-2002. (\$74,179).
29. Theory and Algorithms for L_1 Splines
Army Research Office, 2001-2004. (\$191,666)

PUBLICATIONS - BOOKS

1. *Entropy Optimization and Mathematical Programming*
with J.R. Rajasekera and H.S.J. Tsao, (ISBN 0-7923-9939-0), Kluwer Academic Publishers, Boston/London/Dordrecht, 1997.
2. *Fuzzy Mathematics and Optimization*
with Dingwei Wang, Chinese Version, (ISBN 7-03-005829-1) published by the Science Press, Beijing, China, 1997.
3. *Linear Optimization and Extensions: Theory and Algorithms*
with S.C. Puthenpura, (ISBN 0-13-915265-2), Prentice Hall, Englewood Cliffs, New Jersey, 1993.

Chinese Version published by Science Press, (ISBN 7-03-003911-4), Beijing, China, 1994.
4. *Introduction to Optical Fiber Communications*
(Chinese Edition), published by National Translation and Compiler Bureau of Taiwan, R.O.C., 1986, 2nd edition 1992.
5. *AT&T Factory Data Network Planning Book*
AT&T Corporate Headquarters, Berkeley Heights, New Jersey, 1987.

PUBLICATIONS - BOOKS EDITED AND BOOK CHAPTERS

1. *Quantitative Management Techniques and Applications in Taiwan* (Guest Editor)
with C. Kao, Special Issue of *International Journal of Operations and Quantitative Management*, Vol. 4, No. 3, December, 1998.
2. *Softcomputing for Industrial Engineering* (Guest Editor)
with C. -Y. Lee, Special Issue of the *Journal of Chinese Institute of Industrial Engineers*, Vol. 17, No. 5, 2000.
3. *Geometric Programming, Entropy Optimization and Generalizations* (Guest Editor)
with C. Scott, Special Issue of *Annals of Operations Research*, to appear in 2001.
4. *Entropy Optimization: Measures and Properties*
with H.-S.J. Tsao, in *Encyclopedia of Optimization*, Kluwer Academic Publishers, December, 2000.
5. *Minimum Entropy Principle: Image Reconstruction*
with H.-S.J. Tsao, *Encyclopedia of Optimization*, Kluwer Academic Publishers, December, 2000.

6. *Entropy Optimization: Interior-Point Methods*
with H.-S.J. Tsao, *Encyclopedia of Optimization*, Kluwer Academic Publishers, December, 2000.
7. *Optimal Planning and Sequencing of Parallel Machining Operations*
with Y.-S. Lee and N. Chiu, *in Handbook of Computational Intelligence in Design and Manufacturing*, CRC Press, December, 2001, pp. 8-1 to 8-33.
8. *Analytic Center Based Cutting Plane Method for Linear Semi-infinite Programming*
with S. -Y. Wu and C. -J. Lin, to appear in *Semi-infinite Programming: Recent Advance*, Kluwer Academic Publishers, 2001.
9. *Operations Research*
with S. E. Elmaghraby, to appear in *Encyclopedia of Physical Science and Technology*, Academic Press, Inc., 2001.
10. *Softcomputing for Softgoods Supply Chain Optimization and Management*
with H.L.W. Nuttle, R.E. King and J.R. Wilson, to appear in *soft Computing in Textile Sciences*, Physica-Verlag, Heidelberg, Germany, 2001

PUBLICATIONS - REFEREED JOURNAL ARTICLES

1. *An Iterative Method for Generalized Complementarity Problems*, IEEE-Transaction on Automatic Control, 25-6 (1980), 1225 - 1227.
2. *A Note on Q-Matrices*, Bulletin of the Institute of Mathematics Academia Sinica, 10-3 (1982), 239 - 243.
3. *Traffic Equilibria on Multiclass-User Transportation Networks Analyzed via Variational Inequalities*, Tamkang Journal of Mathematics, 13-1 (1982), 1 - 9.
4. *A Model for Locating Repair Stations in a Sequential Manufacturing Process*, Applied Mathematical Modeling, 6 (1982), 363 - 368.
5. *Generalized Variational Inequalities*, with E.L. Peterson, Journal of Optimization Theory and Applications, 38-3 (1982), 363 - 383.
6. *Solving Linearly Constrained Separable Convex Programs via Generalized Geometric Programming Duality*, Chinese Journal of Mathematics, 10-2 (1982), 103 - 112.
7. *Fixed Point Models for the Equilibrium Problems on Transportation Networks*, Tamkang Journal of Mathematics, 13-2 (1982), 181 - 191.
8. *A Sequential Algorithm for an Inventory Selection Problem*, IMA Journal of Applied Mathematics, 31 (1983), 161 - 168
9. *General Network Equilibrium Analysis*, with E.L. Peterson, International Journal of Systems Science, 14-11 (1983), 1249 - 1257.
10. *Routing in a Network with Multi-Class Links*, Journal of Operational Research, 35-7 (1984), 637 - 640.
11. *A Linearization Method for Generalized Complementarity Problems*, IEEE-Transaction on Automatic Control, 29-10 (1984), 930 - 933.
12. *A Fixed-Point Representation of the Generalized Complementarity Problem*, with E.L. Peterson, Journal of Optimization Theory and Applications, 45-3 (1985), 375 - 381.
13. *An Economic Equilibrium Model on a Multicommodity Network*, with E.L. Peterson, International Journal of Systems Science, 16-4 (1985), 479 - 490.
14. *Optimal Assortment with Concave Cost Functions*, International Journal of Systems Science, 16-10 (1985), 1305 -1311.
15. *Controlled Dual Perturbations of l_p Programming*, with J.R. Rajasekera, Zeitschrift fur Operations Research-Theory, 30-1 (1986), A29 - 42.

16. *On An Iterative Method for Generalized Complementarity Problems*, IEEE-Transaction on Automatic Control, 31-1 (1986), 1083 - 1084.
17. *Controlled Perturbations for Quadratically Constrained Quadratic Programs*, with J.R. Rajasekera, Mathematical Programming, 36-3 (1986), 276- 289.
18. *Optimal Repair Decisions for Integrated Circuits Manufacturing*, International Journal of Systems Science, 18-4(1987), 74 - 747.
19. *A Perturbation Approach to the Main Duality Theorem of Quadratic Geometric Programming*, with J.R. Rajasekera, Zeitschrift fur Operations Research-Theory, 31-3 (1987), A103 - 118.
20. *Controlled Dual Perturbations for Posynomial Programs*, with J.R. Rajasekera and E.L. Peterson, European Journal of Operational Research, 35-1 (1988), 111 - 117.
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5. Paul Hsing Luh, *Multiserver Telecommunication Network Scheduling, (Best Student's Thesis Award of the TIMS Southeastern Region)*, PhD dissertation (May 1992), NCSU Operations Research Program, National Cheng-Chi University, Taiwan, R.O.C..
6. Ruey-Lin Sheu, *Generalized Path Following Algorithms for Linear Programming Problems*, PhD dissertation (August 1992), NCSU Operations Research Program, AT&T Bell Laboratories.
7. Patricia Sun, *Hunter Douglas Line Balancing and Optimization*, Master of Operations Research (August 1993), NCSU Operations Research Program, Taipei Bank, Taiwan, R.O.C..
8. Frederic Robin, *A Heuristic Algorithm for the Bale Assignment Problem*, Master of Science thesis (December 1993), NCSU Operations Research Program, U.S. Peace Corp.
9. Yen-Hung Chen, *A Generalized Simulation Model of Weaving Mill Operations*, Master of Science thesis (August 1994), NCSU Operations Research Program, PhD Program at North Carolina State University.
10. Shankar Mishra, *A Maximum Entropy Optimization Approach to Tandem Queues with General Blocking*, PhD dissertation (December 1994), NCSU Operations Research Program, Sable Decision Technologies.
11. Mark E. Kraus, *A Generalized Path-Following Approach for Linear Semi-Infinite Programming Problems*, PhD dissertation (December 1994), NCSU Operations Research Program, U.S. Air Force Institute of Technology.

12. Cheng-Feng Hu, *Computational Experiments on the Dual Feasible Region Perturbation Method for Linear Programming*, Master of Science thesis (August 1995), NCSU Operations Research Program, PhD Program at North Carolina State University.
13. Afi Davis, *Fuzzy Optimization for ABB Substation Layout*, Master of Operations Research (August 1995), NCSU Operations Research Program, PhD Program at North Carolina State University.
14. Madan Natu, *Point-to-Point Connection and Loading Problems*, PhD dissertation (August 1995), NCSU Operations Research Program, Chesapeake Management Company.
15. Sichong Guan, *Stochastic Linear Programming via Affine Scaling and Kalman Filtering*, PhD dissertation (August 1995), NCSU Operations Research Program, Fruit of the Loom.
16. John Curtis Badgett, *A Method for Simulating Queueing Systems with Fuzzy Parameters*, Master of Science thesis (December 1996), NCSU Industrial Engineering Program, U.S. Navy - Naval Warfare Center.
17. Peitsang Wu, *Decision Surface Modelling for Textile Manufacturing and Management*, PhD dissertation (May 1997), NCSU Operations Research Program, I-Shou University, Taiwan. (**NSF Thesis Award, Taiwan**)
18. Yen-Hung Chen, *Neural Network Technology for Solving Convex Programming Problems and Its Applications*, PhD dissertation (August 1997), NCSU Operations Research Program, I2 Technologies.
19. Cheng-Feng Hu, *Solving Systems of Fuzzy Inequalities*, PhD dissertation (August 1997), NCSU Operations Research Program, I-Shou University, Taiwan.
20. Mike Huang, *Fuzzy Control of the Wave Soldering Process*, Master of Operations Research (August 1997), NCSU OR Program, Price Water House.
21. Michael Lewis, *Impact of Hurricanes on Construction Bidding*, Master of Operations Research (August 1997), NCSU OR Program, Air Force Civil Engineering Support Agency.
22. Chukwunenye Ukwu, *Dynamics of Path-Following Trajectories for Linear Programming*, Master of Science thesis (August 1997), NCSU IE and OR Program, Fayette State University.
23. Jianjun Lu, *Fuzzy Abductive Reasoning with Applications*, (**Best Student's Thesis Award of the INFORMS Southeast Region**), PhD dissertation (November 1997), NCSU Operations Research Program, Nortel.

24. Afi L. Davis, *Fuzzy Control System Design with Applications to Communication Network Design*, PhD dissertation (November 1997), NCSU Operations Research Program, National Security Agency.
25. Forrest B. Stringer, *Robust Confidence Interval Estimation for Neural Network Decision Surfaces*, Master of Science Thesis (August, 1998), NCSU Operations Research Program, American Management Systems.
26. Nanchieh Chiu, *Sequencing Parallel Machining Process by Soft-Computing Techniques*, Ph.D. dissertation (December, 1998), NCSU Operations Research Program, Polaris Securities, Taiwan.
27. Jiranut Loetamonphong, *Solving Multi-Objective Optimization Problems with Fuzzy Relation Equation Constraints*, PhD dissertation (May, 1999), NCSU Industrial Engineering Program, I2 Technologies.
28. Ulrich Schuewer, *Optimal Investment with Imprecise Information Flow*, Master of Science Thesis (August, 1999), NCSU Operations Research Program, Aachen University, Germany.
29. Ta-wei Hung, *Fuzzy System Identification Problems*, PhD dissertation (August, 1999), NCSU Operations Research Program, Shih-Chien University, Taiwan.
30. Djuana Lea, Master of Operations Research (December, 1999), NCSU Operations Research, PhD Program at NC State University.
31. Constance Lightner, *Fuzzy Control Based Buffer Management System for ATM Networks*, PhD dissertation (May, 2000), NCSU Operations Research Program, Fayetteville State University, NC.
32. Andres Medaglia, *Simulation Optimization Using Soft Computing*, PhD dissertation (December, 2000), NCSU Operations Research Program, SAS Institute, Inc.
33. Shyh-Huei Chen, *Solving Systems of Linear Inequalities*, PhD dissertation (May 2001), NCSU Operations Research Programs, National Yunlin University of Science and Technology, Taiwan.
34. Burcu Ozcam, *Genetic Algorithms for Disjoint Path Problems with Proportional Path Costs*, Master of Science thesis (August, 2001), NCSU Industrial Engineering, Continue for PhD Studies at NC State University.

Ph.D. Committees**Total=40**

Student Name	Degree	Chair	Member	Year
Guo-Ming Jian	Ph.D.	X		1990
Hsing Paul Luh	Ph.D.	X		1992
Ruey-Lin Sheu	Ph.D.	X		1992
Tom Prettyman	Ph.D.		X	1992
Sophia Liu	Ph.D.	X		1992
Sanghwa Jeong	Ph.D.		X	1993
Yao-Hsien Lee	Ph.D.		X	1993
Shanka Mishra	Ph.D.	X		1994
Mark Kraus	Ph.D.	X		1994
Jimmy Huang	Ph.D.		X	1994
Jeff Joins	Ph.D.		X	1994
Prhabu Mayem	Ph.D.		X	1995
Chris Houck	Ph.D.		X	1995
Madan Natu	Ph.D.	X		1995
Sichong Guan	Ph.D.	X		1995
Sing-Yih Fu	Ph.D.		X	1996
Mike Kuhl	Ph.D.		X	1996
Guanzhi Li	Ph.D.	X		1997
Peitsang Wu	Ph.D.	X		1997
Cheng-Feng Hu	Ph.D.	X		1997
Yen-Hung Chen	Ph.D.	X		1997
Afi Davis	Ph.D.	X		1997
Jianjun Lu	Ph.D.	X		1997
Nan-Chieh Chiu	Ph.D.	X		1998
Tianhao Zhang	Ph.D.	X		1998
J. Loetamonphong	Ph.D.	X		1999
David Ress	Ph.D.		X	1999
Ta-Wei Hung	Ph.D.	X		1999
Andres Medagalia	Ph.D.	X		2000
Shyh-Huei Chen	Ph.D.	X		2001
Yi Liao	Ph.D.	X		2001
Constance Lightner	Ph.D.	X		2001
Djuana Lea	Ph.D.	X		2001
Scott Schultz	Ph.D.		X	2001
Shonna Davidson	Ph.D.		X	2001
Hao Cheng	Ph.D.	X		2001
Shunmin Wang	Ph.D.	X		2001
S. Ilker Birbil	Ph.D.	X		2001
Yue Dai	Ph.D.	X		2001
Saowanee Lertworasirikul	Ph.D.	X		2001

Master Committees**Total = 25**

Student Name	Degree	Chair	Member	Year
Matthew J. Beattie	Master	X		1990
Rucy-Lin Sheu	Master	X		1990
Tianmin Zhang	Master	X		1990
James Weeks	Master	X		1992
Arnt VonPlatz	Master	X		1992
Ido Gandamana	Master		X	1992
Michael Benzi	Master		X	1992
Paul Stanfield	Master		X	1992
Scott Kegler	Master		X	1992
Fredric Robin	Master	X		1993
Patricia P. Sun	Master	X		1993
Nan-Chieh Chiu	Master		X	1993
Yen-Hung Chen	Master	X		1994
Cheng-Feng Hu	Master	X		1995
Afi Davis	Master	X		1995
Kui Wang	Master		X	1995
Steve Reynolds	Master		X	1995
Curtis Badget	Master	X		1996
Mike Huang	Master	X		1997
Michael Lewis	Master	X		1997
U. Chukwunenye	Master	X		1997
Forrest Stringer	Master	X		1998
Ulrich Schuewer	Master	X		1999
Burcu Ozcam	Master	X		2001
Carin Lightner	Master	X		2001

Visiting Scholars Hosted

1. Dr. Dingwei Wang, Professor of Systems Engineering, Northeastern University, Shenyang, P.R. China, Aug. 94 - Dec. 94.
2. Dr. Xingshi Li, Professor of Control Engineering, Dalian University of Technology, Dalian, P.R. China, Sep. 95 - June 96.
3. Ms. Xiao-Yan Chen, Instructor of Computer Science, Beijing University, P.R. China, April 97 - Dec. 97.
4. Mr. Jian-Feng Lu, Instructor of Computer Science, Nanjing University, P.R. China, June 97 - Nov. 97.
5. Dr. Hsiao-Fan Wang, Professor of Industrial Engineering, National Tsinghua University, Taiwan, R.O.C., July 97 - June 98.
6. Dr. Jong Soon Kim, Professor of Management Science, Kangwon National University, Korea, Dec. 97 - June 98.
7. Dr. Dingwei Wang, Professor of Systems Engineering, Northeastern University, Shenyang, P.R. China, Jan. 98 - May 98.
8. Dr. Yuzhong Qu, Assistant Professor of Computer Science, Southeastern University, Nanjing, P.R. China, Jan. 99 - June 99.
9. Dr. Fei-Long Chen, Professor of Industrial Engineering, National Tsinghua University, Taiwan, R.O.C., September 2000 – February 2001.
10. Dr. Jiye Han, Professor of Applied Mathematics, National Academy of Science, Beijing, P.R. China, November 2000 – February 2001.
11. Dr. Dingwei Wang, Professor of Systems Engineering, Northeastern University, Shenyang, P.R. China, February 2001 – May 2001.

Government

- State Representative, Joint National Information Infrastructure Technology Advisory Group, appointed by Governor James B. Hunt, Jr., of the State of North Carolina, 1995.
- North Carolina - Shanghai Taskforce, to form partnership between North Carolina and Shanghai for developing a strategic plan for economic cooperation, appointed by Governor James B. Hunt, Jr., of the State of North Carolina, 1999.

Industry

- Co-Organizer, North Carolina-Taiwan National Information Super-Highway Infrastructure Delegation Visiting Program, 1995.
- IBM Delegation to China, with representatives from IBM Software Solutions and IBM China to work out joint ventures between IBM and the Chinese Software Park in Shenyang, China, 1999.

University

- Member, University Committee on International Programs, 1990-present.
- Member, Selection Committee for NCSU Student Study Aboard Scholarship, 1990-present.
- Chair, University Committee on International Programs, 1993-94.
- Member, Selection Committee for NCSU Faculty International Seed Grant Award, 1994-present.
- Advisor, Search Committee for Director of International Students and Scholar Office, 1996.
- Member, Advisory Council of International Programs, 1996-present.
- Coordinator, NC State China Programs, 1999-present.
- Member, Selection Committee for NCSU Alumni Outstanding Research Award, 1999.
- Member, Search Committee for NCSU Director of International Programs.

College

- Director, Graduate Program in Operations Research, 1990-95.
- COE Coordinator of International Programs, 1990-present.
- Chair, COE International Programs Committee, 1990-95.
- Member, COE Executive Committee, 1990-95.
- Member, COE Graduate Studies Committee, 1990-95, 1999-present.
- COE Liaison to Chinese and Taiwan Universities, 1990-present.
- Member, Nomination Committee for Henry A. Foscue Professorship, 1998.
- Chair, COE Research Committee, 1999-present.

Department

- Member, IE Personnel Committee, 1988-present.
- Member, IE Department Head Search Committee, 1989.
- Member, IE Graduate Studies Committee, 1990-present.
- Member, IE/OR PhD Qualifying Exam Committee, 1988-present.
- Member, IE Planning Committee, 1990-present.
- Chair, OR Personnel Committee, 1990-95.
- Chair, OR Program Committee, 1988-96.
- Chair, OR PhD Qualifying Exam Committee, 1990-95.
- Member, IE Department Head Search Committee, 1999.

Other

- Member, College of Textile Graduate Studies Committee, 1995-present.
- Visiting University Examiner, Chinese University of Hong Kong, 1996-present.