

Jeffrey C. Kantor
Professor

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University of Notre Dame
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RESEARCH INTERESTS

Current Research Interests: The analysis and optimization of integrated financial and process operations using methods of stochastic control, convex optimization, and quantitative finance.

Previous Interests: Dynamics and control of nonlinear chemical systems, multivariable robust control, nonlinear state estimation, analysis of discrete-event systems for process control.

EDUCATION

Ph.D. Chemical Engineering, Princeton University, January 1981
M.A., Chemical Engineering, Princeton University, May 1977
B.S.Ch.E, Chemical Engineering, University of Minnesota, 1976

MEMBERSHIPS

Fellow, American Association for the Advancement of Science (AAAS)
Senior Member, Institution of Electrical and Electronic Engineers (IEEE)
Senior Member, American Institute of Chemical Engineers (AIChE)

PROFESSIONAL EXPERIENCE

2007 – Associate Vice President, Special Projects
2006 – Professor, Department of Chemical & Biomolecular Engineering

2001 – 2006: Vice President for Graduate Studies and Research, and Dean of the Graduate School, University of Notre Dame.
Responsibilities:

- Oversight of graduate studies (excluding MBA and Law) of 21 PhD, 30 Master's degree programs, and \$54 million budget for

tuition scholarships, stipends, and endowed fellowships.
Enrollment increase of 31%, PhD degrees awarded by 50%.

- Oversight of the Office of Research. Sponsored research expenditures awards increase from \$43 million to \$68 million in FY 2005.
- Established new Office for Technology Transfer and Commercialization.
- Responsible for institutional relationship with the ND/IU Medical Education program adjacent to the ND campus.

1996 - 2001 Vice President & Associate Provost, University of Notre Dame.

Direct reports include

- Office of Information Technology
- University Registrar
- Institutional Research
- University Archives
- Web Administration
- Washington Hall Management
- Academic Space Management

Responsible to the Provost for academic space planning, academic budgeting, special professional, library, and non-regular faculty appointments, capitalization of new faculty, university classrooms and academic space renovation. Led University effort on eLearning. Member of the University Budget Working Group, Officer's Budget Committee, University Capital Planning Committee. Led academic programming for major capital projects:

- Coleman/Morse Building (\$14M)
- Renovation of Flanner Hall (\$11M)
- Malloy Hall (\$14M)
- Renovation of Hayes-Healy/Hurley (\$8M)
- Performing Arts Center (\$58M)
- Science Learning Center (\$70M)

1995 – 1996 Professor and Chair, Department of Chemical Engineering, University of Notre Dame.

1992 – 1995 Professor, Department of Chemical Engineering, University of Notre Dame.

1988 Visiting Professor, Institute for Process Systems Engineering, Imperial College of Science and Technology, London.

- 1986 – 1992 Associate Professor, Department of Chemical Engineering, University of Notre Dame.
- 1981 – 1986 Assistant Professor, Department of Chemical Engineering, University of Notre Dame.
- 1980 – 1981 Post-doctoral Researcher, Department of Chemistry, University Tel Aviv and Department of Chemical Engineering, Technion. Professors Leonid Pisman and Benjamin Levich, advisors.
- 1978 – 1979 Consultant, Mobil Technical Support, Princeton, New Jersey.
- 1976 Summer employment, Atlantic Richfield Research Laboratories, Plano, Texas
- 1975 - 1976 Summer employment, and consulting service, Lawrence Livermore Laboratories, Department of Chemistry.

PROFESSIONAL AND CIVIC SERVICE

- 2007 – present: Board of Directors, Cytology for Life. A newly establish not-for-profit with a mission to develop and a novel low cost flow cytometer and deploy to Africa and other contexts to assist in the diagnosis of AIDS.
- 2004 – 2006: At-large Director, Indiana Health Industry Forum.
- 2003 – present: Board of Directors, Madison Center (\$100 million/year, 1100 employee Mental health service provider located in Northern Indiana).
 2004-2006: Board Vice-Chair
 2006-2008 Elected Chair to serve a two year term.
- 2001 – 2004: Board of Directors, Indiana 21st Century Fund Policy Board (Gubernatorial appointment).
- 2001 – 2005: Board of Directors, St. Joseph County Chamber of Commerce.
- 2001 – 2004: Board of Directors, Indiana Health Industry Forum.
- 2001 – present: Board of Directors, Medical Education Foundation of South Bend.
- 2001 – 2006: Treasurer, Executive Committee, and Board of Directors , GEM National Consortium for Graduate Degrees for Minorities in Engineering and Science.
- 1993 – 1996: Director of the Computing & Systems Technology Division of the American Institute of Chemical Engineers.

1993 – 1998: Elected Trustee (2 terms), CACHE Corporation (Corporation for Chemical Engineering Education).

1993 Associate Editor, Automatica

DISTINCTIONS

2005 Reverend Theodore Hesburgh Leadership Award, GEM National Consortium
 2005 Elected Fellow, American Association for the Advancement of Science (AAAS)
 1986 Camille & Henry Dreyfus Foundation Teacher-Scholar Award, 1986
 1985 NSF Presidential Young Investigator Award
 1982 Amoco Foundation Young Faculty Award
 1981 Dreyfus Foundation Research Initiation Award
 1979 George Van Ness Lathrop Fellow, An honorific fellowship awarded at Princeton University
 1973/4 Student Representative to the Board of Regents, University of Minnesota

RESEARCH GRANTS (PRINCIPAL INVESTIGATOR UNLESS NOTED)

Camille and Henry Dreyfus Foundation:

1981: Research Initiation Grant for Newly Appointed Faculty in Chemistry (\$25,000)

1986: Teacher-Scholar Grant Award (\$50,000)

INTEL Corporation:

1985: Computer Hardware (\$10,000)

National Science Foundation:

1983: Research Initiation Grant: State Estimation for Systems Exhibiting Complex Nonlinear Oscillations (\$64,000)

1985: Presidential Young Investigator Award (\$62,500)

1986: Presidential Young Investigator Award (Cont.) (\$62,500)

1987: Presidential Young Investigator Award (Cont.) (\$62,500)

1988: Presidential Young Investigator Award (Cont.) (\$62,500)

1989: Presidential Young Investigator Award (Cont.) (\$62,500)

1992: Studies on Integrated Process Monitoring and Control (\$90,000)

1993: Studies on Integrated Process Monitoring and Control (\$70,000)

1995: Studies on Integrated Process Monitoring and Control (\$70,000)

1995: The Next Generation of Tuned Liquid Dampers for Controlling Structural Motions, co-PI with Ahsan Kareem (\$286,346) through 1998

Dupont Corporation:

1985: Matching Money for NSF-PYI (\$8,000)

1986: Matching Money for NSF-PYI (\$8,000)

1992: Multi resolution analysis for Data Compression (\$20,000)

Lockheed Martin:

1995: Wind Loading and Capacities of Components, Connections and Systems, co-PI with Ahsan Kareen and investigators from Clemson and Texas A&M (\$849,000 total, \$276,303 to Notre Dame)

Shell Development Company and Shell Companies Foundation:

1985: Matching Money for NSF-PYI (\$15,000)

1986: Matching Money for NSF-PYI (\$20,000)

1987: Matching Money for NSF-PYI (\$15,000)

1988: Matching Money for NSF-PYI (\$15,000)

1989: Matching Money for NSF-PYI (\$15,000)

1990: Studies in Process Control (\$15,000)

1991: Studies in Process Control (\$15,000)

Sun Microsystems:

1985: Matching Equipment for NSF-PYI (\$25,000)

Rohm and Haas:

1986: Matching Grant for NSF-PYI (\$5,000)

ICI Americas:

1986: Matching Grant for NSF-PYI (\$5,000)

Apple Computer, Inc:

1989: Computer Hardware (\$9,000)

PH.D. DISSERTATIONS SUPERVISED

Adam Changan Cheng (Ph.D., 2001). Perturbed Linear Programming Problems Arising From Process Monitoring, 188 pp.

S. Thapliyal (Ph.D., 2001). Model Validation for Process Monitoring and Fault Detection, 152 pp.

Adam Poloski (Ph.D., 1999). Application of Model Predictive Control to Hybrid Systems and Batch Processes, 159 pp.

Alfredo A. Elias-Juarez (Ph.D., 1997), Model Predictive Control from Orthonormal Wavelet Bases with Compact Support.

Ioannis Faitakis (Ph.D., 1996), Sensor and Activator Fault Detection in Discrete-Time Systems using an Optiaml Filter, 176 pp.

Arturo del Sagrado Corazon Sanchez Carmona (Ph.D., 1994 – Imperial College of Science and Technology, London). Formal Specification and Synthesis of

Sequential/Logic Controllers for Process Systems, 237 pp. (Co-advisor with Prof. Sandro Machietto).

Abdelhamid Ajbar (Ph.D., 1993), Robust Control and Monitoring of Discrete-Time Feedback Systems.

Katrina Yamalidou (Ph.D., 1991), Modeling, Optimization and Control of Discrete Event Processes Using Petri Net Theory, 190 pp.

Leonid Poslavsky (Ph.D., 1991), Analysis and Design of Variable Structure Control Systems for Chemical Processes, 209 pp.

Eleni Patsidu (Ph.D., 1990), Scheduling, Optimization and Control of Multipurpose Batch Plants, 174 pp.

Lulu Limquenco (Ph.D., 1990), Application of Geometric Methods for Nonlinear Control, 150 pp.

Michael Keenan (Ph.D., 1989), Robustness of Nonlinear and Linear Feedback Control Systems, 160 pp.

Janet Fox (Ph.D., 1985), The Design of Robust H^∞ Control Systems for Multivariable Chemical Processes, 301 pp.

Karlene Hoo (Ph.D., 1985), State Estimation and Control of Nonlinear Systems Exhibiting Complex Dynamical Behavior, 143 pp.

John Dever (Ph.D., 1985), The Use of Right Half Plane Zeros to Discriminate Reaction Models, (with J. J. Carberry), 116 pp.

William Schmidt (Ph.D., 1985), Dynamics and Control of Optimized Chemical Reaction Systems, 193 pp.

M.S. DISSERTATIONS SUPERVISED

Anees Attarwala (M.S., in-progress), On the Integration of Process Operations and Finance.

Olivier Boissel (M.S., 1993), Petri Net Analysis of Catalytic Reformer Operations, 119 pp.

Robert O'Brien (M.S., 1988), Experimental Demonstration of a Nonlinear Inverse with Feedback Control, 96pp.

Lance Edwards (M.S., 1985), Chemical Process Control by Inversion of a Nonlinear Process Model - A Feedback Approach, 85 pp.

Emile Richard (M.S., 1984), State Estimation for Chaotic Reaction Systems, 85 pp.

COURSES TAUGHT

EG 112	Introduction to Engineering Systems II
CHEG 258	Computer Methods in Chemical Engineering
CHEG 358	Chemical Engineering Laboratory I
CHEG 438	Chemical Process Control
CHEG 443	Separation Processes
CHEG 448	Chemical Process Design
CHEG 542	Mathematical Methods for Chemical Engineering I
CHEG 544	Mathematical Methods for Chemical Engineering II
CHEG 638	Advanced Chemical Process Control

EDITED VOLUME

Kantor, J. C., C. Garcia, and B. Carnahan, editors. "Chemical Process Control V: Assessment and New Directions for Research", 357 pp, AIChE Symposium Series, vol. 316 1997.

JOURNAL PUBLICATIONS

Mei, G., A. Kareem, and J. C. Kantor, "Model Predictive Control of Wind-Excited Building: Benchmark Study," Journal of Engineering Mechanics, 130(4), 459-465, 2004. [1]

Poloski, Adam P., and Jeffrey C. Kantor, "Application of model predictive control to batch processes," Computers and Chemical Engineering, 27, 913-926, 2003.

Mei, G., A. Kareem, and J. C. Kantor, "Model Predictive Control of Structures Under Earthquakes using Acceleration Feedback," Journal of Engineering Mechanics, 128(5), 574-585, 2002. [1]

Mei, G., A. Kareem, and J. C. Kantor, "Real-Time Model Predictive Control of Structures under Earthquakes," Earthquake Engineering & Structural Dynamics, 30, 995-1019, 2001. [1]

Yalla, S., A. Kareen, and J. C. Kantor, "Semi-Active Tuned Liquid Column Dampers," *Engineering Structures*, 23, 1469-1479, 2001. [12]

Faitakis, Y. E., S. Thapliyal, and J. C. Kantor, "An LMI Approach to the Evaluation of Alarm Thresholds," *International Journal of Robust and Nonlinear Control*, 8, No. 8, 659-77, 1998. [2]

Yannis E. Faitakis and Jeffrey C. Kantor, "Residual Generation and Fault Detection for Discrete-Time Systems using an *l(infinity)* technique," *International Journal of Control*, 64, No.1, 155-174, 1996. [4]

Ajbar, H., M. R. Keenan and J. C. Kantor, "Optimal Linear Regulation with Hard Constraints", *AIChE Journal*, Vol. 41, No. 11, 2439-2450, 1995. [1]

Lee, J. H., Y. Chikkula, Z. Yu and J. C. Kantor, "Improving Computational Efficiency of Model Predictive Control Algorithm Using Wavelet Transformation", *International Journal of Control*, 61, No. 4, 859-883, 1995. [4]

Boissel, O. R., and J. C. Kantor, "Optimal Feedback Control Design for Discrete-Event Systems using Simulated Annealing", *Computers and Chemical Engineering*, Vol. 19, No. 3, 253-266, 1995 [6]

Kantor, J. C., and B. F. Spencer, Jr., "On Real Parameter Stability Margins and their Computation," *International Journal of Control*, 57, 453-462, 1993. [6]

B. F. Spencer, M. K. Sain, J. C. Kantor, and C. Montemagno, "Probabilistic Stability Measures for Controlled Structures Subject to Real Parameter Uncertainties," *Smart Materials and Structures*, 1, 294-305, 1992.

Yamalidou, E. C., and J. C. Kantor, "Modeling and Optimal Control of Discrete-Event Chemical Processes Using Petri Nets," *Computers and Chemical Engineering*, 15, 503-519, 1991. [25]

Patsidou, E. P., and J. C. Kantor, "Scheduling of a Multipurpose Batch Plant Using a Graphical Derived Mixed-Integer Linear Program Model," *IEC Research*, 30, 1548-1561, 1991. [5]

Patsidou, E. P., and J. C. Kantor, "Application of Minimax Algebra to the Study of Multipurpose Batch Plants," *Computers in Chemical Engineering*, 15, 35-46, 1991. [3]

Limqueco, L., J. C. Kantor, and S. Harvey, "On Nonlinear Adaptive Observation of an Exothermic Reactor," *Chemical Engineering Science*, 46, 797-805, 1991. [12]

Kravaris, C., and J. C. Kantor, "Geometric Methods for Process Control. 2. Controller Synthesis," *IEC Research*, 29 2310-2323, 1990. [122]

Kravaris, C., and J. C. Kantor, "Geometric Methods for Process Control. 1. Background," *IEC Research*, 29, 2295-2310, 1990. [50]

Limqueco, L., and J. C. Kantor, "Nonlinear Output Feedback Control of an Exothermic Reactor," *Computers in Chemical Engineering*, 14, 427-437, 1990. [30]

Yamalidou, E. C., E. P. Patsidou, and J. C. Kantor, "Modeling Discrete-Event Dynamical Systems for Chemical Process Control - A Survey of Several New Techniques," *Computers in Chemical Engineering*, 14, 281-299, 1990. [18]

Kantor, J. C., "A Nonlinear Sliding-Mode Controller and Objective Function for Surge Tanks," *Int. J. Control*, 50, 2025-2047, 1989. [10]

Kantor, J. C., "A Finite Dimensional Nonlinear Observer for an Exothermic Stirred-Tank Reactor," *Chemical Eng. Science*, 44, 1503-1510, 1989. [30]

Hoo, K. A., and J. C. Kantor, "Global Linearization and Control of a Mixed Culture bioreactor with Competition and External Inhibition," *Mathematical Biosciences*, 82, 43-62, 1986. [19]

Hoo, K. A., and J. C. Kantor, "Linear Feedback Equivalence and Control of an Unstable Biological Reactor," *Chemical Engineering Communications*, 46, 385-399, 1986. [38]

Hoo, K. A., and J. C. Kantor, "A Thermodynamic Criterion for the Nonsingularity of Vapor Liquid Equilibria in Distillation Processes," *Chem. Eng. Science*, 40(9), 1788-1790, 1985.

Hoo, K. A., and J. C. Kantor, "An Exothermic Continuous Stirred Tank Reactor is Feedback Equivalent to a Linear system," *Chem. Eng. Commun.*, 37, 1-10, 1985. [70]

Kantor, J. C., "A Dynamical Instability of Spark Ignited Engines," *Science*, 224, 1233, 1984. [7]

Kantor, J. C., and R. P. Andres, "Characterization of 'Allowable Perturbations' for Robust Stability," *IEEE Trans. Auto. Control*, AC-28, 107-109, 1983. [33]

Kantor, J. C., and R. P. Andres, "The Analysis and Design of Smith Predictors Using Singular Nyquist Arrays," *Int. J. Control*, 31(4), 655-664, 1980. [3]

Kantor, J. C., and R. P. Andres, "A note on the extension of Rosenbrock's Nyquist array techniques to a larger class of transfer function matrices," *Int. J. Control*, 30, 387-393, 1979. [7]

OTHER PUBLICATIONS OF AN EDUCATIONAL OR GENERAL NATURE

Kantor, Jeffrey, Samuel Hulpert and Christi Bradley, "Sciences in Indiana's Future," Michiana Point of View (Editorial/Opinion), South Bend Tribune, 650 words, June 5, 2003.

Kantor, J. C. and T. F. Edgar, "Computing Skills in the Chemical Engineering Curriculum," CACHE 25th Anniversary Volume, 1996.

Kantor, Jeffrey C. "Matrix Oriented Computation Using Matlab," CACHE News, Spring 1989, 27-36. Reprinted in Texas Instruments Application Notes in Digital Signal Processing, Irfan Ahmed (Editor), 83-92, 1991.

Kantor, Jeffrey C. "Benchmark Problem 90-93" in "Benchmark Problems for Control Systems Design," Report of the Theory Committee for the International Federation of Automatic Control, E. J. Davison (Editor), May, 1990.

Kantor, Jeffrey C. "Robust Process Control by Manfred Morari, Evangelos Zafiriou," (Book Review), AIChE Journal, 37, 1905-6, 1991.

Kantor, Jeffrey C. "Process Dynamics and Control," (Book Review), Chem. Eng. Education, 27, (1), 32-35.

CONFERENCE PUBLICATIONS APPEARING IN PRINT

Mei, G., A. Kareem, and J. C. Kantor, "Model Predictive Control of Wind-Excited Building: A Benchmark Problem," Proc., 14th Engineering Mechanics Conf., ASCE, New York, 2000.

Mei, G., A. Kareem, and J. C. Kantor, "Model Predictive Control for Wind and Earthquake Applications," Proceedings of the 8th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability, Notre Dame, Indiana, July 24-26, 2000

Yalla, Swaroop K., Ahsan Kareem, and Jeffrey C. Kantor, "Semiactive Variable-Damping Liquid Column Dampers," Proceedings of SPIE – Volume 3988 Smart Structures and Materials 2000: Smart Systems for Bridges, Structures, and Highways, S.-C. Liu, Editor, pp. 75-83, 2000.

Mei, G., A. Kareem, and J. C. Kantor, "Model Predictive Control of Structures Under Earthquake Loads," Proceedings of the Second World Conference on Structural Control, John Wiley, June 28-July 1, 1998, Kyoto.

Chen, Changan, and Jeffrey C. Kantor, "Warm start of the primal-dual interior point method for process monitoring," Proceedings of the 1997 American Control Conference, pp. 2955-2959, 1997.

Thapliyal, S. and J. C. Kantor, "Model Validation: Approaches and Application Issues," Proceedings of the IFAC '96 World Congress, 1996.

Antsaklis, P. J. and J. C. Kantor, "Intelligent Control for High Autonomy Process Control Systems," Proceedings of ISPE '95, 1996.

Y. E. Faitakis and J. C. Kantor, "Residual Based Fault Detection using an Output Observer," Proceedings of the 1995 American Control Conference, pages 1255-1259, 1995.

B. F. Spencer, M. K. Sain, J. C. Kantor, "Reliability-Based Measures of Stability for Actively Controlled Structures," Proceedings of the ICOSSAR'93-The 6th International Conference on Structural Safety & Reliability, Innsbruck, Austria, 9-13 August, 1993, pages 1591-1598, 1994.

Kantor, Jeffrey C., and Billie F. Spencer, Jr., "Is Robust Control Reliable?" " Modeling of Uncertainty in Control Systems," Roy S. Smith and M. Dahlell (Editors), Springer-Verlag, pages 65-67, 1994.

Ahsan Kareem, Kurt Gurley, and Jeffrey C. Kantor, "Time-Scale Analysis of Nonstationary Processes Utilizing Wavelet Transforms", Proceedings of the ICOSSAR'93-The 6th International Conference on Structural Safety and Reliability, Innsbruck, Austria, 9-13 August, 1993, pages 1647-1654, 1994.

Y. E. Faitakis, S. Thapliyal and J. C. Kantor, "Computing Bounds for a Simple Fault Detection Scheme", Proceedings of the 1994 American Control Conference, pages 2638-2642, 1994.

S. Thapliyal, Y. E. Faitakis and J. C. Kantor, "A Model Validation Approach to Fault Detection", Proceedings of the 1994 American Control Conference, pages 3027-3028, 1994.

Ajbar, Abdelhamid, and Jeffrey C. Kantor, "Time Domain Approach to the Design of Integrated Control and Diagnosis Systems," " Modeling of Uncertainty in Control Systems," Roy S. Smith and M. Dahlell (Editors), Springer-Verlag, pages 337-365, 1994.

Boissel, Olivier R., and Jeffrey C. Kantor, "Optimal control for discrete-event systems using simulated annealing," Proceedings of the 1993 American Control Conference, pp. 2533-2537, 1993.

Elias-Juarez, Alfredo, and Jeffrey C. Kantor, "On the Application of Wavelets to Model Predictive Control," Proc. of the 1992 ACC, pages 1582-1586

Elias-Juarez, Alfredo, Abdelhamid Ajbar, and Jeffrey C. Kantor, "Multivariable Control with Integrated Diagnostics for Chemical Processes," Proceedings of the 4th

International Symposium on Process Systems Engineering, Montebello, Quebec, Canada, II.3.1-II.3.15, 1991.

Elias-Juarez, Alfredo, Abdelhamid Ajbar, and Jeffrey C. Kantor, "Multiobjective L_1 Design With Integrated Diagnostics," Proceedings of the 1991 American Control Conference, 1671-1672, 1991.

Poslavsky, Leonid, and Jeffrey C. Kantor, "Sliding Modes Control of an Exothermic Continuous Stirred Tank Reactors," Proceedings of the 1991 American Control Conference, 2872-2857, 1991.

Patsidou, E., and J. C. Kantor, "Optimal Scheduling and Control of Multipurpose Batch Plant," Proceedings of the IFORS Conference, Athens, Greece, June 1990

Keenan, M. R., and J. C. Kantor, "An L_∞ Optimal Performance Approach to Linear Feedback Control," pp, 269-290 in The Shell Process Control Workshop II, D. M. Prett (Ed.), Butterworths, 1990.

Kantor, J. C., "On the Analytical Computation of Optimal Trajectories for Batch Reactors," Proceedings of the 1990 American Control Conference, 1638-1643, 1990.

Kantor, J. C., and M. R. Keenan, "An L_1 Optimal Performance Approach to Robust Feedback Control," Proceedings of the 1989 American Control Conference, 549-553, 1989.

Kantor, J. C., "A Rapprochement of Feedback and Feedforward Linearization with Process Control Practice," Proceedings of the 1988 American Control Conference, 1552-1558, 1988.

Kantor, J. C., and M. R. Keenan, "Static Nonlinear Control of Chemical Processes," Proceedings of the Eleventh IFAC World Congress, 1987.

Kantor, J. C., and M. R. Keenan, "Stability Constraints for Nonlinear Static State Feedback," Proceedings of the 1987 American Control Conference, 2126-2131, 1987.

Kantor, J. C., "An Overview of Nonlinear Geometrical Methods for Process Control," in Process Control Research: Industrial and Academic Perspectives, D. M. Prett and M. Morari (Ed.), pp. 225-250, Butterworth, 1987.

Kantor, J. C., "Stability of State Feedback Transformations for Nonlinear Systems - Some Practical Considerations," Proceedings of the 1986 American Control Conference, 1014-1016, 1986.

Kantor, J. C., "Spectral Radius Design for Robust Multivariable Control," Proceedings of the 1986 American Control Conference, 7-10, 1986.

Kantor, Jeffrey C., "Control in the Presence of Model Uncertainty – Session Summary," Proceedings of the Third International Conference on Chemical Process Control, Asilomar, California, January 12 – 17, pp. 1–3, 1986. (appearing in Manfred Morari and Thomas J. McAvoy, Editors. Chemical Process Control – CPC III, CACHE Publications, Austin, TX, 1986).

Antsaklis, P. J., and J. C. Kantor, "Sensitivity Analysis for Model Based Control Configurations," Proceedings in Multivariable Feedback Systems Using M-matrices," Proceeding of 1985 American Control Conference, 1309-1314, 1985.

Kantor, J. C., and R. P. Andres, "Multivariable Control of Two Input-Two Output Systems," Proceedings of the 1979 Joint Automatic Control Conference, 844-890, 1979.

INVITED SEMINARS, COLLOQUIA, AND KEYNOTE LECTURES

"Frequency Response Synthesis of Multivariable Feedback Controllers," Israel Institute of Technology (Technion), Haifa, Israel Dec. 1980.

"Nonlinear State Estimation for Systems Exhibiting Complex Dynamics," Shell Development Company, Westhollow Research Center, Houston, Texas, April 1983.

"Process Alarm Monitoring and Fault Diagnosis," Shell Development Company, Westhollow Research Center, Houston, Texas, July 1984.

"Linear Feedback Equivalence and the Control of Nonlinear Systems," Department of Chemical Engineering, Purdue University, October 1984.

"Global Linearization and Nonlinear Control Design for Several Chemical and Biochemical Systems," Department of Chemical Engineering, University of Pennsylvania, September 1958.

"Global Linearization and Nonlinear Control Design for Chemical Systems," Department of Chemical Engineering, University of Washington, October 1985.

"Global Linearization and Nonlinear Control Design for Several Chemical and Biochemical Systems," Department of Chemical Engineering, California Institute of Technology, January 1986.

"Global Linearization and Nonlinear Control Design for Several Chemical and Biochemical Systems," Department of Chemical Engineering, University of Delaware, February 1986.

"Global Linearization and Nonlinear Control Design for Several Chemical and Biochemical Processes," Department of Chemical Engineering, Auburn University, April 1986.

"Global Linearization and Nonlinear Control Design for Several Chemical and Biochemical Processes," Department of Chemical Engineering, University of Massachusetts, April 1986.

"An Overview of Nonlinear Geometrical Methods for Process Control," Shell Development Company, Houston, December 15, 1986.

"A Geometric Approach to Nonlinear Process Control," Department of Chemical Engineering, University of Wisconsin, October 1987.

"Applications of Nonlinear Geometric Methods to Several Problems in Process Control," Control Engineering Program, University of Michigan, Ann Arbor, November 6, 1987.

"Geometric Approaches to Nonlinear Control," Department of Chemical Engineering, Imperial College, London, January 22, 1988,

"Applications in Nonlinear Control," Department of Electrical Engineering, Imperial College, London, March 9, 1988.

"Discrete-Event Models for Batch Chemical Processes," Department of Chemical Engineering, Imperial College, London, May 20, 1988,

"Nonlinear Methods for Chemical Process Control," Department of Chemical Engineering, University of Illinois, September 13, 1988.

"Discrete-Event Models for Batch Chemical Processes," Shell Development Company, Systems Development Group, Houston, August 31, 1988.

"Nonlinear Methods for Chemical Process Control," Department of Chemical Engineering, Northwestern University, January 26, 1989.

"Geometric Approaches to Nonlinear Process Control," Department of Chemical Engineering, Princeton University, October 4, 1989.

"Geometric Approaches to Nonlinear Process Control," Center for Process Modeling and Control, Lehigh University, October 5, 1989.

"Geometric Approaches to Nonlinear Process Control," Department of Chemical Engineering, Carnegie-Mellon University, October 31, 1989.

"Geometric Approaches to Nonlinear Process Control," Department of Chemical Engineering, University of Maryland, March 27, 1990.

"Symmetry in Process Control," Department of Chemical Engineering, Purdue University, September 6, 1990.

"Symmetry in Process Control," Department of Chemical Engineering, Louisiana State University, September, 1990.

"Symmetry in Process Control," Department of Chemical Engineering, University, of Massachusetts, March 14, 1991.

"Hybrid Models for Discrete-Event Processes," Amoco Research Center, Naperville, IL, August 1991.

"Multiresolution Techniques for Process Control," Shell Development Company, Houston, TX, September 1991.

"Multivariable Control with Integrated Diagnostics for Chemical Processes," (with A. Elias-Juarez and A. Ajbar) Keynote talk at the Process and System Engineering Conference, Montreal, October 1991.

"Nonlinear Methods for Process Control," Department of Chemical Engineering, University of Alberta, Edmonton Alberta, December 1991.

"Wavelets and Control," Department of Chemical Engineering, Auburn University, April 1992.

"Multiresolution Approaches to Process Control," Institute for Mathematics and its Applications, University of Minnesota, October 1992.

"Process Monitoring and Diagnosis," University of Minnesota, Minneapolis, May 1993.

"Issues in Process Monitoring and Model Validation," to the Department of Chemical Engineering, University of Florida, Gainesville, Florida, March 14, 1994.

"Issues in Process Monitoring," Dupont Engineering Station, Wilmington, DE, March 1994.

"The Syllabus for Undergraduate Process Control Education," Invited presentation at a special session on Process Control Education, 1995, American Control Conference, Seattle, Washington, June 23, 1995

"Intelligent Control for High Autonomy Process Systems" (with P. J. Antsaklis), Conference on Intelligent Systems in Process Engineering (ISPE '95), Snowmass, CO, July 10, 1995.

"A Survey of Recent Approaches to Model Based Process Monitoring," Mobil Corporation, December 2, 1995.

"Linear Hybrid Models for Process Applications," University of Cincinnati, February 1, 1996.

"Linear Hybrid Models for Process Applications," University of Connecticut, April 1, 1996.

"Integrating Finance and Control," Department of Chemical and Biomolecular Engineering, University of Notre Dame, May 9, 2006.

CONFERENCE PRESENTATIONS

"Multivariable Control of Two Input-Two Output Systems," Joint Automatic Control conference, Denver, June 1979.

"Sensitivity Analysis for Model Based Control Configurations," (with P. J. Antsaklis) Third Automatic Control Conference, San Diego, June 1984.

"Comparison Sensitivity and Feedback Control for Optimized Chemical Reactors," (with J. M. Fox and W. J. Schmidt) Third Automatic Control Conference, San Diego, June 1984.

"Interactive Computer Graphics for Process Control Simulation," Society for Computer Simulation, Midwestern Simulation Council Fall Meeting, Notre Dame, October 1984.

"Occurrences of Zeros in Optimized Chemical Processes," (with W. J. Schmidt and J. M. Fox), AIChE Annual Meeting, San Francisco, November 1984.

"A Thermodynamic Criterion for Unique Steady States in Multicomponent, Homogeneous Distillation Processes," (with K. A. Hoo), AIChE Annual Meeting, San Francisco, November 1984.

"The Analysis of Robust Stability and Performance in Multivariable Feedback Systems Using M-matrices," 1985 American Control Conference, Boston, June 1985.

"Application of Global Controllability Results to Control Design for Nonlinear Chemical Systems," (with K. A. Hoo.), AIChE Annual Meeting, Chicago, November 1985.

"Stability of State Feedback Transformations for Nonlinear Systems - Some Practical Considerations," 1986 American Control Conference, Seattle, June 1986.

"Spectral Radius Design for Robust Multivariable Control," 1986 American Control Conference, Seattle, June 1986.

"Design of Static Controllers for Nonlinear Chemical Processes," AIChE Annual Meeting, Miami, November 1986.

"Stability Constraints for Nonlinear Static State Feedback," 1987 American Control Conference, Minneapolis, June 1987.

"Reasoning in Time about Discrete Event Systems," Advanced Control Systems User Group Meeting, Purdue University, West Lafayette, Indiana, July 1987.

"Static Nonlinear Control of Chemical Processes," 10th IFAC World Congress, Munich, July 1987.

"Robust Stability of Nonlinear State Feedback Controllers," AIChE Annual Meeting, New York, 1987.

"A Rapprochement of Feedback and Feedforward Linearization with Process Control Practice," 1988 American Control Conference, June, 1988. (Awarded Best Paper of Session).

"Nonlinear Output Feedback Control of an Exothermic Reactor," AIChE Annual Meeting, Washington, November 30, 1988.

"An l^∞ Optimal Performance Approach to Linear Feedback Control," Shell Process Control Workshop, Houston, December 14, 1988.

"Modeling and Analysis of Discrete-Event Processes Using Petri Net Theory," (with E. C. Yamalidou), 1989 AIChE Annual Meeting, San Francisco, November 7, 1989.

"A Multi-Objective l_1 -optimal Approach to Disturbance Rejection," (with M. R. Keenan), 1989 AIChE Annual Meeting, San Francisco, November 8, 1989.

"On the Scheduling and Control of Multipurpose Batch Plants," (with E. Patsidou), 1989 AIChE Annual Meeting, San Francisco, November 9, 1989.

"Nonlinear Adaptive Control and Observation of an Exothermic Stirred Tank Reactor," (with L. Limqueco and S. Harvey), 1989 AIChE Annual Meeting, November 10, 1989.

"On the Analytical Computation of Optimal Trajectories for Batch Reactors," 1990 American Control Conference, San Diego, May, 1990.

"Nonlinear Control of Instantaneous Reaction Systems", 1990 American Control Conference, San Diego, May, 1990.

"Optimal Scheduling and Control of Multipurpose Batch Plants," (with E. Patsidou), IFORS Conference, Athens Greece, June 1990.

"Model Predictive Control for Discrete-Event Systems," (with E. C. Yamalidou and E. P. Patsidou), 1990 AIChE Annual Meeting, Chicago, November 1990.

"Reliable l_1 Linear Control Design for Hard Constraints," 1990 AIChE Annual Meeting, Chicago, November 1990.

"Optimization and Control of Batch Plants with Multiple Units per Stage and Alternative Processing Paths," (with E. P. Patsidou), 1990 AIChE Annual Meeting, Chicago, November 1990.

"Optimization and Control of Discrete-Event Processes Using Petri Net Models," (with E. C. Yamalidou), 1990 AIChE Annual Meeting, Chicago, November 1990.

"Sliding Mode Control of an Exothermic Continuous Stirred Tank Reactor," (with L. Poslavsky), 1991 American Control Conference, Boston, June 1991.

"Multiobjective l_1 Design with Integrated Diagnostics," 1991 American Control Conference, Boston, June 1991.

"Symmetry, Invariance, and Nilpotent Approximation in Process Control," 1991 AIChE Annual Meeting, Los Angeles, CA, 1991.

"Petri Net Analysis of Feedback Control for Sequential and Discrete-Event Systems," (with E. C. Yamalidou), 1991 AIChE Annual Meeting, Los Angeles, CA, 1991.

"Integrated Linear Regulation and Fault Detection for Hard Constraints," (with A. Elias-Juarez and A. Ajbar), AIChE Annual Meeting, Los Angeles, CA, 1991.

"Verification of a Chemical Reactor Network Safety Interlock Design using Petri Nets," (with N. F. Jerome), 3rd IFAC Symposium on Dynamics and Control of Chemical Reactors, Distillation Columns, and Batch Processes, College Park, MD, April 1992.

"On the Application of Wavelets to Model Predictive Control", (with A. Elias-Juarez), 1992 American Control Conference, Chicago, IL, June 25, 1992.

"Motion Planning for Chemical Processes", SIAM Conference on Control and its Applications, Minneapolis, MN, September, 1992.

"An L_1 Approach to Robust Control and Fault Detection", (with A. Ajbar) 1993 American Control Conference, San Francisco, CA, June 1993.

"Optimal Control for Discrete-Event Systems Using Simulated Annealing", (with O. Boissel) 1993 American Control Conference, San Francisco, CA, June 1993.

"An l -Infinity Approach to Robust Control and Fault Detection", (with A Ajbar) AIChE 1993 Annual Meeting, St. Louis, MO, November 1993.

"A Model Validation Approach to Fault Diagnosis", (with I. Faitakis and S. Thapliyal) AIChE 1993 Annual Meeting, St. Louis, MO, November 1993.

"Mutual Exclusion Constraints on 'Linear' Hybrid Models," Workshop on "Analysis and Design of Event-Driven Operations in Process Systems" April 10-11, 1995, Imperial College, London, U. K.

"A Class of Linear Hybrid Models", Third SIAM Conference on Control and its Applications, April 28, 1995, St. Louis, Missouri.

"Design of a Robust Fault Detection Filter using an l-infinity Optimization Technique," (with Y. Faitakis), 1995 AIChE Annual Meeting, Miami, FL, November 13, 1995.

"A Model Identification Approach to Process Monitoring," (with C. Chen), 1995 AIChE Annual Meeting, Miami, FL, November 15, 1995.

"Process Monitoring and Fault Detection by Validation of Robust Models," (with S. Thapliyal), 1995 AIChE Annual Meeting, Miami, FL, November 16, 1995.

"Model Validation: Approaches and Application Issues," (with S. Thapliyal), IFAC '96 World Congress, San Francisco, CA, July 1996.

"Integrating Finance and Control for Process Operations," 2005 AIChE Annual Meeting, Cincinnati, OH, October 31, 2005.

"On the Integration of Finance and Process Operations," (with A. Attarwala), 2007 AIChE Annual Meeting, Salt Lake City, UT, November 7, 2007.

PROFESSIONAL ACTIVITIES

Program Committee: 2008 American Control Conference, Seattle, Washington.

General Chair of Chemical Process Control-V, 1996.

Elected General Chair in 1995 of the 1999 American Control Conference, stepped down after 1996 after being named VP at Notre Dame.

Elected to three-year term as Director of the Computing & Systems Technology Division of the American Institute of Chemical Engineering, 1993 - 1996

Program Committee: Conference on Computer Integrated Manufacturing in the Process Industries, Rutgers University, April 1994.

Elected trustee of the CACHE Corporation, 1993, Reelected, 1995

Program Chair: 1994 American Control Conference, Baltimore, MD, 1994.

Chair for Contributed Papers: 1993 American Control Conference, San Francisco, 1993.

Steering Committee: American Association for Automatic Control, 1993-1999.

Program Committee: AIENG 92 - Applications of Artificial Intelligence in Engineering, University of Waterloo, Canada, 1992.

Session Organizer: American Society for Engineering Education Summer School for Chemical Engineering Faculty, Bozeman MT, August 1992.

Conference Session Chair: "Chaotic Systems", American Control Conference, Chicago, IL, 1992.

Program Committee: 1992 IFAC Symposium on Dynamics and Control, University of Maryland, April 1992.

External PhD Examiner: University of Alberta, December 1991.

Conference Session Chair: "Recent Advances in Process Control, I-III," AIChE Annual Meeting, Los Angeles, CA, 1991.

Awards Committee: Richard E. Bellman Control Heritage Award for the American Automatic Control Committee, 1991.

Executive Committee: Computing and Systems Technology Division of the American Institute of Chemical Eng., 1990-1992.

Program Committee: AIENG 91 - Applications of Artificial Intelligence in Engineering, Oxford University, UK, 1991.

Organizing Committee, Chemical Process Control IV, 1991.

NRC-NSF Graduate Fellowship Panel, Washington D.C., February, 1991.

Invited Panelist: "Process Control Education in the 1990's," AIChE Annual Meeting, 1990.

Chair of AIChE Applied Mathematics Area (Area 10D) 1990-1991.

IEEE Working Group on Discrete-Event Systems, 1990.

Chair for Invited Sessions,, 1991 Conference on Decision and Control, Brighton, England.

Vice-Chair of the Applied Mathematics Section (Area 10D) for the American Institute of Chemical Engineers, 1990.

Conference Session Chair: "Novel Applications of Mathematics in Chemical Engineering," (with H.-Chia Chang, cochair) AIChE Annual Meeting, Chicago, 1990.

National Research Council Graduate Fellowship Evaluation Panel (Engineering A), Washington D.C., February, 1990.

Program Committee, Twelfth IFAC World Congress, Tallinn, USSR, 1990.

Conference Session Chair: "New Methods for Control Analyses", American Institute of Chemical Engineers Annual Meeting, Chicago, 1990.

Program Committee, 1989 American Control Conference, Pittsburgh, 1989.

National Research Council Graduate Fellowship Evaluation Panel (Engineering A), Washington D. C., February 7-9, 1989.

Conference Session Chair: "Nonlinear Process Control," AIChE Annual Meeting, Washington, 1988.

Program Vice Chairman for Invited Sessions, 1988 American Control Conference, Atlanta, 1988.

National Science Foundation, 1988 Presidential Young Investigator Award Review Panel, Washington, December 1987.

Lecturer: "A Model Based Approach to Teaching Process Control," (with M. Morari, C. Kravaris, and B. R. Holt. 1987 Summer School for Chemical Engineering Faculty, American Society for Engineering Education. Southeastern Massachusetts University, 1987.

Committee: CACHE task force on Artificial Intelligence in Chemical Engineering, 1987.

Conference Session Chair: "Robust Control for Chemical Processes," Eleventh IFAC World Congress, Munich, 1987.

Conference Session Chair: "Nonlinear Process Control," 1987 American Control Conference, Minneapolis, 1987.

Conference Session Chair: "Robustness and Uncertainty in Process Control Design," 1986 Automatic Control Conference, Seattle, 1986.

Conference Session Chair: "Control Design for Uncertain Systems," Chemical Process Control III, Asilomar, 1986.

Lecturer: "Techniques which Minimize the Cost and Maximize the Impact of Data in Research and Engineering" (with J. S. Hunter, C. Savini, and G. Shea). University of Notre Dame Center for Continuing Education, November 1985.

Conference Session Chair: "Modelling, Model Reduction, and Modelling Uncertainty in the Context of Feedback Control" 2 sessions (with M. Morari, Co-Chair) Fourth Automatic Control Conference, Boston, 1985.

Advisory Committee: Third International Conference on Chemical Process Control, Asilomar, 1986.

Organizer and Lecturer: "Advanced Methods for Chemical Process Control" (with G. Stephanopoulos and C. Garcia). University of Notre Dame Center for Continuing Education, September 10 - 12, 1984.

Conference Session Chair: "Robust Multivariable Control for Chemical Processes," Third Automatic Control Conference, San Diego, 1984.

University Duties:

Director of Graduate Studies, Chemical Engineering	1986 - 88 1990 -
Departmental Committees	
Computer Facilities and Utilization	1981 -
Courses and Curriculum	1981 - 1983
Honesty and Standards	1981 - 1983
Instructional Labs	1981 -
Accreditation	1981 - 1983
Graduate Studies	1983 - 1989 - 1990
Engineering College Services Committee	1981 - 1985
Engineering College Graduate Studies Committee	1984 - 1987
University Rhodes/Marshall Endorsement Committee	1986 - 1988
Engineering College Council (elected)	1988 - 1990
University Computer Committee (elected)	1989 - 1993
Graduate Priorities Committee	1989 -
Review of Mathematics Graduate Program	1990
Graduate Council	1990 - 1994

College Committee on Long-Range Issues in Engineering Education	1994
University Committee on Research, Infrastructure, and Scholarship (elected)	1993 - 1994
Chair of Committee to Review Graduate Bulletin	1992 - 1994
University Committee to Review Undergraduate Admissions	1994 - 1995
Chair of Engineering College Council adhoc subcommittee on EG120	1994 - 1995