Francis Joseph Doyle III

Department of Chemical Engineering
University of California, Santa Barbara
Santa Barbara, CA 93106-5080
(805) 893-8133
FAX: (805) 893-4731
frank.doyle@icb.ucsb.edu

EDUCATION

B.S.E., Chemical Engineering, Princeton University — June 1985

C.P.G.S., Chemical Engineering, Cambridge University — June 1986

Ph.D., Chemical Engineering, California Institute of Technology — June 1991

ACADEMIC APPOINTMENTS

ASSISTANT, ASSOCIATE PROFESSOR — August 1992 – August 1997
School of Chemical Engineering, Purdue University

ASSOCIATE PROFESSOR, PROFESSOR — August 1997 – August 2002
Department of Chemical Engineering, University of Delaware

HUMBOLDT RESEARCH FELLOW — September 2001 – June 2002
Institut für Systemtheorie Technischer Prozesse, Unìversìtät Stuttgart, Germany

PROFESSOR — August 2002 – present
Duncan & Suzanne Mellichamp Endowed Chair in Process Control
Department of Chemical Engineering, University of California, Santa Barbara

PROFESSOR — June 2003 – present
Department of Electrical Engineering, University of California, Santa Barbara

GUEST INVESTIGATOR — April 2003 – present
Sansum Diabetes Research Institute, Santa Barbara

ASSOCIATE DIRECTOR — September 2003 – present
UCSB/MIT/Caltech Institute for Collaborative Technologies

PROFESSOR — September 2004 – present
Biomolecular Science & Engineering Program, University of California, Santa Barbara

INDUSTRIAL EXPERIENCE

PROCESS ENGINEER — Summer 1984, 1985
DuPont Polymers, Wilmington, DE

VISITING RESEARCH SCIENTIST — September 1991 – August 1992
DuPont Polymers, Wilmington, DE

VISITING RESEARCH SCIENTIST — Summer 1994, 1995, 1998
Weyerhaeuser Company, Tacoma, WA

INDUSTRIAL CONSULTING — 1992 – present
Abbott Laboratories, Boehringer Mannheim/Roche Diagnostics Corporation, CAE-Link Corporation, DOE, E.I. DuPont deNemours & Co., Integrated Engineering Technologies (IETek), McDermott, Will & Emery LLP, OSHA, Procter & Gamble, Quantum Chemical, Savannah River Site (DOE), Weyerhaeuser Company, White & Case LLP, Williams, Kastner & Gibbs, PLLC

HONORS AND AWARDS

Computing in Chemical Engineering Award (AIChE CAST Division), 2005.
IEEE Senior Member, 2004
Duncan and Suzanne Mellichamp Endowed Chair in Process Control, 2002-present.
Alexander von Humboldt Research Fellow, 2001-2002.
Defense Science Study Group, 2001-2002.
Featured Educator, Chemical Engineering Education, **34**(3), 2000.
ASEE *Ray Fahien Award*, 2000.
Purdue University Teachers for Tomorrow Award, 1996.
Office of Naval Research Young Investigator Award, 1996-1999.
ASEE Section Outstanding Teacher Award (Illinois/Indiana), 1996.
Tau Beta Pi *Dean Marion B. Scott Exemplary Character Award*, 1996.
R.N. Shreve Prize, Chemical Engineering Teaching Award, 1995, 1997.
A.A. Potter Award, Engineering Teaching Award, 1995.
National Science Foundation National Young Investigator Award, 1992-1997.
Montebello Town Center Scholarship, 1989, 1990.
Texaco Fellowship in Chemical Engineering, 1988, 1989.
Shell Fellowship in Chemical Engineering, 1987.
W. Averell Harriman Scholar ("*most outstanding Churchill Scholar*"), 1986.
Winston Churchill Fellowship, 1985.
Graduated with Highest Honors (summa cum laude), 1985.
Class of 1916 Cup (graduating Varsity athlete with highest G.P.A.), 1985.
Xerox Prize ("*most outstanding Senior Thesis in ChE Department*"), 1985.
Diamond State Scholar (recognition of academic performance in Delaware), 1984.
J. Rich Steers Award ("*on basis of scholastic performance which demonstrates potential for further engineering study and practice*"), 1984.
AIChE Annual Chapter Scholarship Award, 1983.
Chevron Scholar Award in Chemical Engineering, 1983.

PROFESSIONAL SOCIETIES AND OFFICES

ADA – American Diabetes Association
AIChE – American Institute of Chemical Engineers
- Director, CAST Division, 2001 – 2003
- 2nd Vice Chair, CAST Division, 2007 – 2008

ASEE – American Society of Engineering Education
CACHE - Computer Aids for Chemical Engineering, Trustee 1998-present
- Secretary, 2002 – 2004
- Vice President, 2006 – 2008

IEEE – Institute of Electrical & Electronics Engineers
- Technical Committee on Process Control, CSS, 2002 – present

IFAC – International Federation for Automatic Control
- Technical Committee on Process Control, 1998 – present
- Vice Chair, TC on Process Control, 2003 – present

Omega Rho
Phi Beta Kappa
Sigma Xi
SRBR – Society for Research on Biological Rhythms
Tau Beta Pi
TAPPI – Technical Association of the Pulp and Paper Industry

PROFESSIONAL ACTIVITIES

International Program Chair / Conference Organization on major conferences including:

- *IFAC Conference on Advanced Control of Chemical Processes*, Gramado, Brazil, April, 2006
- *Foundations of Systems Biology in Engineering*, Santa Barbara, CA, August, 2005
- *Process Control Track*, IFAC World Congress, Barcelona, Spain, June, 2002
- *Process Control Track*, IFAC World Congress, Beijing, China, June, 1999
- *NSF/NIST Vision 2020 Workshop on Process Measurement and Control: Industry Needs*, March, 1998

International Programming Committee on major conferences including:

- *Foundations of Systems Biology in Engineering*, Santa Barbara, CA, September, 2007
- *Conf. on Population Balance Modelling of Particulate Systems,* Quebec City, Canada, September, 2007
- *Intl. Conference on Systems Biology,* Yokohama, Japan, October, 2006
- *Control Systems 2006*, Tampere, Finland, June 2006
- *2nd International Conference on Population Balance Modelling*, Valencia, Spain, May, 2004
- *IFAC Symposium on Dynamics and Control of Process Systems*, Cambridge, July, 2004
- *International Symposium on Advanced Control of Chemical Processes*, Hong Kong, January, 2004
- *Chemical Process Control VI Meeting*, Tucson, January, 2001
- *IFAC Symposium on Dynamics and Control of Process Systems*, Korea, 2001
- *International Symposium on Advanced Control of Chemical Processes*, Pisa, Italy, June, 2000
- *IFAC Symposium on Dynamics and Control of Process Systems*, Corfu, Greece, June, 1998
- *International Symposium on Advanced Control of Chemical Processes*, Banff, Canada, June, 1997
- *PSE-ESCAPE Meeting*, Trondheim, Norway, May, 1997
- *Chemical Process Control V Meeting*, Lake Tahoe, January, 1996

Invited Participant:

- *NSF-EU Workshop on Infrastructure for Systems Biology*, Boston, May, 2007
- *NRC Workshop on Systems Microbiology*, Washington DC, August, 2003
- *NIST Workshop on Intelligent Control (*sole academic participant), October, 1998
- *TAPPI Paper Industry Research Challenges Conference*, Wisconsin Rapids, September, 1996
- *ONR Workshop on Cellular Controls*, Wilmington, June, 1996
- *NSF Workshop on Architectures for Control and Learning in Natural and Artificial Systems*, November, 1995
- *ONR/DuPont Workshop on Neuromorphic Engineering for Process Control*, Wilmington, July, 1995
- *NSF Review Panel on Biosystems Analysis and Control*, April, 1995.

Ad hoc manuscript and book reviewer for:

A.I.Ch.E. Journal, A.S.M.E. J. Dyn. Sys, Measur. Control, Automatica, Chem. Eng. Comm., Chem. Eng. Educ., Chem. Eng. Sci., Comp. Chem. Eng., IEEE Trans. Auto. Control, IEEE Trans. Control Sys. Tech., Ind. & Eng. Chem. Res., Int. J. Control, J. Proc. Control, Oxford University Press, McGraw-Hill, Science, IEE Systems Biology, Proc. Nat. Acad. Sci. USA, PLoS Comp. Biology, BMC Bioninformatics

Active in session chair and organization responsibilities at meetings sponsored by:

AIChE, AACC, ASEE, CACHE, ECC, IFAC, TAPPI

EDITORIAL ACTIVITIES

- **Editor-in-Chief**, *IEEE Transactions on Control Systems Technology*, 2004 – present.
- **Editorial Board**, *Interface (Royal Society Journal)*, 2004 – present.
- **Editorial Board**, *SIAM Journal on Applied Dynamical Systems*, 2003 – present.
- **Editor for Special Papers**, *Journal of Process Control*, 1997-present.
- **Associate Editor**, *IEEE Transactions on Control Systems Technology*, 1997-2003.
- **Editorial Board**, *Industrial & Engineering Chemistry Research*, 2002-2004.

Guest Editor Responsibilities:

- Special Issue of *Journal of Process Control,* IFAC ADCHEM Conference, 17(3), 2007.
- Special Issue of *Control Engineering Practice,* IFAC ADCHEM Conference, 2007.
- Special Issue of *IEE Systems Biology*, Foundations of Systems Biology in Engineering, **152**(4), 2005.
- Special Issue of *IEEE Engineering in Medicine and Biology Magazine*, Biomedical Control Systems, **20**(1), 2001.
- Special Issue of *Journal of Process Control*, IFAC World Congress, **10**(5), 2000.
- Special Issue of *Control Engineering Practice*, IFAC World Congress, **8**, 2000.
- Special Issue of *Computers and Chemical Engineering*, Summary of Vision 2020 Workshop on Process Measurement and Control, **23** (8), 1999.

RESEARCH INTERESTS

- Biosystems analysis and control: the application of systems engineering principles to the analysis of regulatory mechanisms in biological systems
- Modeling, analysis, and control of gene regulatory networks underlying circadian rhythms
- Biomedical control systems synthesis: control-relevant design of drug delivery devices for diabetes
- Application of advanced control schemes to nonlinear, multivariable, constrained industrial processes with emphasis on: particulate systems and pulp & paper operations
- Characterization of process nonlinearity for control-relevant design
- Large scale applications of MPC including plant-wide control and cross direction control of sheet/film processes
- Experimental studies of nonlinear model-based control of particle size distribution in a semi-batch emulsion polymerization reactor

RESEARCH CONSORTIUM ACTIVITIES

- Founding Member, UCSB/UMass/UIUC Process Design & Control Consortium, 2003-present
- Director, UD Process Monitoring and Control Consortium (PCMC), 1998 – 2002
- Founding Member, Purdue Computer Integrated Process Operations Consortium, 1992 – 1997

CURRENT GRADUATE STUDENTS

• Nada Bagheri (Ph.D. Elec. Eng., expected 8/07), *Robustness Analysis of the Gene Network Underlying Circadian Rhythm*
• Mustafa Dokucu (Ph.D. expected 8/07), *Experimental Studies in Emulsion Polymerization*
• Scott Hildebrandt (Ph.D. expected 10/07), *Sensing and Analyzing Stress During Protein Expression*
• Jason Shoemaker (Ph.D. expected 6/08), *Analysis of Robustness in Biological Switches*
• Stephanie Taylor (co-advised with Prof. Linda Petzold, Ph.D., CompSci, expected 6/08), *Robustness in Oscillatory Biological Systems*
• Henry Mirsky (Ph.D.,BioChem, expected 6/09), *Hierarchical Control in the Mammalian Circadian Clock*
• Matthew Percival (Ph.D. expected 6/10), *Modeling and Control for Type 1 Diabetes*
• Theresa Yuraszeck (Ph.D. expected 6/10), *Modeling the Unfolded Protein Response in Yeast*
• Jamilah Abdur-Rahim (Ph.D. expected 6/10), *Identification of Control for Learning in Visual-Motor Skill*
• Eric Kwei (Ph.D. expected 6/11), *Systems Biology Analysis of Type 2 Diabetes*

FORMER GRADUATE STUDENTS

• Mehmet Mercangoz (Ph.D. 6/07), *Millwide Control of a Grade Transition in a Pulp Mill* (employed at ABB)
• Rachel Gillis (M.S. 6/07), *Controlled Insulin Delivery During Moderate Stress in Type 1 Diabetes* (employed at Tennessee Eastman)
• Kapil Gadkar (Ph.D. 3/05), *Large Scale Model Identification in Systems Biology* (employed at Entelos)
• Nicholas Hernjak (Ph.D 3/04), *Characterization of Process Nonlinearity* (employed at ExxonMobil)
• Camelia Owens (Ph.D. 6/04), *Robust Regulation of Glucose in Diabetic Patients* (employed at the National Institutes of Health)
• Toby Junker (Ph.D. 9/03*), Modeling and Control of a Continuous Thermo-Evaporation Process for Production of Thin Film Photovoltaic Modules* (employed at Fuel Cell Energy)
• Dan Saffer (Ph.D. 5/03), *Advanced Cross-Direction Control of Sheet and Film Processes* (employed at Alcoa)
• Darrin Feather (M.S., 12/02), *Grade Transition Control in Polymerization Reactors* (employed at Weyerhaeuser)
• Charles Immanuel (Ph.D., 11/02), *Experimental Control Studies of a Semi-batch Emulsion Polymerization Reactor* (faculty member at Imperial College)
• Radhakrishnan Mahadevan (Ph.D., 6/02), *Dynamic Nonlinear Input-Output Control* (faculty member at U. Toronto)
• Jorge Castro-Velez (Ph.D., 9/01), *Mill-wide Control Using Specialized Algorithms for Parallel Large Scale MPC* (employed at DuPont Company)
• Rajanikanth Vadigepalli (Ph.D., 6/01), *Second Messenger Modeling of Neuromodulatory Pathways* (faculty member at Thomas Jefferson Medical University)
• Alan Mahoney (Ph.D., 4/01), *Modeling of Population Balance Equation Descriptions of Precipitation* (faculty member at Sheffield University)
• Ed Gatzke (Ph.D., 6/00), *An Intelligent Approach to Process Monitoring and Control* (faculty member at Univ. South Carolina)
• Luis Puig (M.S., 4/00), *Grade Transition Control in a Pulp Digester* (faculty member at U. Mexico)
• Robert Parker (Ph.D., 6/99), *Biosystems Model-based Control* (faculty member at University of Pittsburgh)
• Arkan Kayihan (M.S., 7/98), *Local Nonlinear Control of a Process Actuator* (employed at Aspen Technology)
• Kairali Podual (Ph.D., 7/98), *Complex Hydrogel Design for Control-Relevant Insulin Delivery* (employed at BioArray Solutions)
• Tom Kendi (Ph.D., 8/97), *Constrained Control of Nonlinear Process Systems* (employed at ExxonMobil)
• Philip Wisnewski (Ph.D., 8/97), *Model Reduction, State Estimation and Model Predictive Control of a Kamyr Digester* (employed at Weyerhaeuser)
• Lalitha Balasubramhanya (Ph.D., 7/97), *Low Order Models for Nonlinear Process Control* (employed at Applied Materials)
• Harpreet Kwatra (Ph.D., 6/97), *A Neuro-mimetic Dynamic Gain Scheduled Process Control* (employed at Envision Financial Systems)

• Christie Dorski (M.S., 12/96), *Dynamic Behavior of Glucose-Responsive Ploy(Methacrylic Acid-g-Ethylene Glycol) Hydrogels*
• Andre Shaw (Ph.D., 8/96), *A Dynamic Neural Network for Nonlinear Process Modeling and Control* (employed at ExxonMobil)
• Bryon Maner (Ph.D., 7/96), *Polymerization Reactor Control Using Computationally Tractable Input-Output Models* (employed at Air Products)
• Douglas Heemstra (M.S., 3/96), *Practical Nonlinear Model Identification and Control Implementation* (employed at Hoechst Celanese)
• Alex Stack (M.S., 9/95), *The Optimal Control Structure: A Measure for Control-Relevant Nonlinearity* (employed at Blake, Cassels, & Graydon)

PRESENT AND FORMER POSTDOCTORAL FELLOWS

• Dr. Zixi Cheng (1/96 - 9/97) (faculty member at U. Kentucky)
• Dr. Scott Meadows (1/98 - 6/00) (faculty member at U. Alberta)
• Dr. Tim Crowley (3/98 - 10/00) (employed at United Technologies)
• Dr. Tahsin Bahar (11/99 - 5/00) (employed at Marmara Research Center, Turkey)
• Dr. Pascal DuFour (7/00 - 7/01) (faculty member at Lyon University, France)
• Dr. Sharad Bhartiya (7/00 – 8/02) (faculty member at IIT, Bombay)
• Dr. Selwa Ben Amor (11/00 – 12/02)
• Dr. Yang Wang (9/01 – 8/03) (employed at Yield Dynamics)
• Dr. Myung-June Park (3/03 – 3/06) (employed at Mt. Sinai School of Medicine)
• Dr. Rudiyanto Gunawan (8/03 – 7/06) (faculty member at National University of Singapore)
• Dr. Cesar Palerm (9/04 - present)
• Dr. Constantijn Sanders (10/05 - present)
• Dr. Eyal Dassau (10/06 - present)
• Dr. Peter Chang (10/06 - present)
• Dr. Pau Herrero Vinas (3/07 - present)

UNDERGRADUATE RESEARCH SUPERVISION

• 41 undergraduate student research projects supervised at Purdue (1992-1997)
• 15 undergraduate student research projects supervised at U. Delaware (1997-2002)
• 10 undergraduate student research projects supervised at UCSB (2003-present)
• 16 publications in journals and conference proceedings from undergraduate research

TEACHING ACCOMPLISHMENTS

- Asynchronous Distance Education – ChE 154/255 to Amgen (Thousand Oaks), Spring 2006
- Co-instructor for Teaching Workshop – "Teaching with Technology" (AIChE Annual Meeting, 2001)
- Developed college-wide engineering course - Control Engineering Laboratory (Spring 1999)
- Instructed UD's first electronic distance education course (CHEG 801 - Fall 1998)
- Fellow, U. Delaware Institute for Transforming Undergraduate Education (ITUE), 1998.
- Developer of PCM (Process Control Modules) for undergraduate process control education.
- Co-organizer of *Purdue Workshop on Process Control Education* (Spring 1992, Purdue University)
- Instructor for the following courses:

University of California, Santa Barbara

- CHE 152B –*Process Dynamics and Control* (Winter 2003 – typical enrollment 5 seniors)
- CHE 256 –*Model Predictive Control* (Spring 2003 – typical enrollment 15 graduate students)
- CHE 10 – *Introduction to Chemical Engineering* (Fall 2003, 2004, 2005, 2006 – typical enrollment 50 sophomores)
- CHE 154/CHE255/BMSE 255 – *Engineering Approaches to Systems Biology* (Spring 2004, 2005, 2006, 2007 – typical enrollment 20 students (seniors & graduates))

University of Delaware

- CHEG 401 – *Chemical Process Dynamics and Control* (Spring 1998, 1999, Fall 1999 – typical enrollment 45 seniors)
- CHEG 432 – *Process Design* (Spring 2001 – typical enrollment 45 seniors)
- CHEG/ELEG/MEEG 467 – *Control Engineering Laboratory* (Spring 1999, 2000, 2001 – typical enrollment 15 seniors)
- CHEG 667 – *Particle Design and Processing* (Winter 2001 – typical enrollment 20 undergraduate students)
- CHEG 801 – *Advanced Process Control* (Fall 1998,1999, Spring 2001 – typical enrollment 8 graduate students and 2 industry registrants)

Purdue University

- CHE 348 – *Chemical Reaction Engineering* (Spring 1996 – enrollment 170 juniors)
- CHE 411/412/498 – *Undergraduate Research* (Fall 1993 to present – approximately 4 students/semester)
- CHE 456 – *Process Dynamics and Control* (Fall 1993, 1994, 1995, 1996 – typical enrollment 190 seniors)
- CHE 597D – *Intermediate Process Control* (Spring 1995 – enrollment 60 seniors, 10 graduate students)
- CHE 597O – *Computer Integrated Process Operations* (Fall 1993, 1995, 1996 team taught – typical enrollment 20 seniors, 10 graduate students)
- CHE 656 – *Advanced Process Control* (Spring 1993, 1997 – enrollment 11 graduate students)
- CHE 697F – *Nonlinear Process Control* (Spring 1994 – enrollment 10 graduate students)

PUBLICATIONS

Refereed Archival Journal Papers

1. F.J. Doyle III, R. Jackson, and P. Ginestra, "The Phenomenon of Mechanical Pinning in a Cylindrical Crossflow Reactor", *Chem. Eng. Sci.*, **41**, 1485-1495, 1986.

2. N. Collings, F.J. Doyle III, A.N. Hayhurst, and D.B. Kittelson, "Charged Species in the Exhaust of a Spark Ignition Engine as Studied with Langmuir Probes and a Mass Spectrometer", *Combustion Science and Technology*, **62**, 31-59, 1989.

3. F.J. Doyle III, A.P. Packard, and M. Morari, "Robust Controller Design for a Nonlinear CSTR", *Chem. Eng. Sci.*, **44**, 1929-1947, 1989.

4. R. Shinnar, F.J. Doyle III, H.M. Budman, and M. Morari, "Design Considerations for Tubular Reactors with Highly Exothermic Reactions", *AIChE J.*, **38**, No. 11, 1729-1743, 1992.

5. M.A. Henson, B.A. Ogunnaike, J.S. Schwaber, and F.J. Doyle III, "The Baroreceptor Reflex: A Biological Control System with Applications in Chemical Process Control", *Ind. & Eng. Chem. Res.*, **33**, 2453-2466, 1994.

6. F.J. Doyle III, T.A. Ogunnaike, and R.K. Pearson, "Nonlinear Model-Based Control Using Second-Order Volterra Models", *Automatica*, **31**, 697-714, 1995.

7. F.J. Doyle III and J. Hobgood, "A Practical Approach to Approximate Input-Output Linearization", *J. Process Control*, **5**, 263-275, 1995.

8. F.J. Doyle III, F. Allgöwer, and M. Morari, "On Nonlinear Systems with Poorly Behaved Zero Dynamics", *IEEE Trans. Aut. Control*, **41**, 305-309, 1995.

9. A. Aoyama, F.J. Doyle III, and V. Venkatasubramanian, "Adaptive Fuzzy Neural Network Approach for Nonlinear Process Control", *Eng. Appls. of AI*, **8**, 483-498, 1995.

10. A. Aoyama, F.J. Doyle III, and V. Venkatasubramanian, "Control-Affine Fuzzy Neural Network Approach for Nonlinear Process Control", *J. Process Control*, **5**, 375-386, 1995.

11. M.H. Bassett, P. Dave, F.J. Doyle III, G.K. Kudva, J.F. Pekny, G.V. Reklaitis, S. Subrahmanyam, D.L.Miller and M.G. Zentner, "Perspectives on Model Based Integration of Process Operations", *Comp. Chem. Eng.*, **20**, 821-844, 1996.

12. A. Aoyama, F.J. Doyle III, and V. Venkatasubramanian, "Control-Affine Neural Network Approach for Nonlinear Non-minimum Phase Process Control", *J. Process Control*, **6**, 17-26, 1996.

13. A. Aoyama, F.J. Doyle III, and V. Venkatasubramanian, "Fuzzy Neural Network Approach for Nonlinear Process Control", *AIChE Symp. Ser.*, **312**, 369-373, 1996.

14. T.A. Kendi and F.J. Doyle III, "Nonlinear Control of a Fluidized Bed Using Approximate Feedback Linearization", *Ind. & Eng. Chem. Res.*, **35**, 746-757, 1996.

15. P.A. Wisnewski and F.J. Doyle III, "A Reduced Model Approach to Estimation and Control of a Kamyr Digester", *Comp. Chem. Eng.*, **20**, S1053-S1058, 1996.

16. B. Maner, F.J. Doyle III, B.A. Ogunnaike, and R.K. Pearson, "Nonlinear Model Predictive Control of a

Multivariable Polymerization Reactor Using Second-Order Volterra Series", *Automatica*, **32**, 1285-1302, 1996.

17. R.K. Pearson, B.A. Ogunnaike, and F.J. Doyle III, "Identification of Structurally Constrained Second-Order Volterra Models", *IEEE Trans. Signal Processing*, **44**, 2837-2846, 1996.

18. F.J. Doyle III, H.M. Budman, and M. Morari, "Theoretical and Practical Aspects of Nonlinear Packed Bed Reactor Control", *Ind. & Eng. Chem. Res.*, **35**, 3567-3580, 1996.

19. R.B. McLain, M.J. Kurtz, M.A. Henson, and F.J. Doyle III, "Habituating Control for Non-Square Nonlinear Processes", *Ind. Eng. Chem. Res.*, **35**, 4067-4077, 1996.

20. F.J. Doyle III, T.A. Kendi, and V. Venkatasubramanian, "PCM: A MATLAB-Based Set of Modules for Undergraduate Process Control", *Comp. Appl. Eng. Ed.*, **4**, 179-190, 1996.

21. A.M. Shaw, F.J. Doyle III, and J.S. Schwaber, "A Dynamic Neural Network Approach to Nonlinear Process Modeling", *Comp. Chem. Eng.*, **21**, 371-385, 1997.

22. H. Kwatra, F.J. Doyle III, J.S. Schwaber, and I. Rybak, "A Neuromimetic Dynamic Scheduling Algorithm for Control: Analysis and Applications", *Neural Computation*, **9**, 479-502, 1997.

23. A.J. Stack and F.J. Doyle III, "Application of a Control-law Nonlinearity Measure to Chemical Reactor Analysis", *AIChE J.*, **43**, 425-447, 1997.

24. L.S. Balasubramhanya and F.J. Doyle III, "Nonlinear Control of a High Purity Distillation Column Using a Traveling Wave Model", *AIChE J.*, **43**, 703-714, 1997.

25. P. Dave, D. Willig, J. Pekny, and F.J. Doyle III, "Tailored Algorithms for Large Scale MPC: An Application to a Paper Machine", *AIChE J.*, **43**, 1016-1031, 1997.

26. Z. Cheng, T.L. Powley, J.S. Schwaber, F.J. Doyle III, "Vagal Afferent Innervation of the Atria of the Rat Heart Reconstructed with Confocal Microscopy", *J. Comp. Neurology*, **381**, 1-17, 1997.

27. A. Shaw and F.J. Doyle III, "Multivariable Nonlinear Control Application of Recurrent Dynamic Neuron Model for Control of a High Purity Distillation Column", *J. Process Control*, **7**, 255-268, 1997.

28. A.J. Stack and F.J. Doyle III, "The Optimal Control Structure: An Approach to Measuring Control-Law Nonlinearity", *Comp. Chem. Eng.*, **21**, 998-1009, 1997.

29. F.J. Doyle III, J.F. Pekny, G.V. Reklaitis, V. Venkatasubramanian, "A Graduate Course in Computer Integrated Process Operations", *Comp. Chem. Eng.*, **21**, S255-S260, 1997.

30. F.J. Doyle III, J.F. Pekny, P. Dave, S. Bose, "Specialized Programming Methods in the Model Predictive Control of Large Scale Systems", *Comp. Chem. Eng.*, **21**, S847-S852, 1997.

31. P.A. Wisnewski, F.J. Doyle III, and C. J. Primus, "Measurement Selection Issues for the Model Predictive Control of a Kamyr Digester", *Can. Pulp Paper*, **98**, T233-236, 1997.

32. B. Maner and F.J. Doyle III, "Simulated Polymerization Reactor Control Using Auto-regressive plus Volterra-based MPC", *AIChE J.*, **43**, 1763-1784, 1997.

33. T. Kendi and F.J. Doyle III, "An Anti-Windup Scheme for Multivariable Nonlinear Systems", *J. Process Control*, **7**, 329-343, 1997.

34. C.M. Hassan, F.J. Doyle III, and N.A. Peppas, "Dynamic Behavior of Glucose-Responsive Poly(methacrylic acid-g-ethylene glycol) Hydrogels", *Macromolecules*, **30**, 6166-6173, 1997.

35. P.A. Wisnewski, F.J. Doyle III, and F. Kayihan, "Fundamental Continuous Pulp Digester Model for Simulation and Control", *AIChE J.*, **43**, 3175-3192, 1997.

36. Z. Cheng, T.L. Powley, J.S. Schwaber, F.J. Doyle III, "A Laser Confocal Microscopic Study of Vagal Afferent Innervation of Rat Aortic Arch: Chemoreceptors as well as Baroreceptors", *J. Aut. Nerv. Sys.*, **67**, 1-14, 1998.

37. H.S. Kwatra, F.J. Doyle III, and J.S. Schwaber, "Dynamic Gain Scheduled Process Control", *Chem. Eng. Sci.*, **53**, 2675-2690, 1998.

38. T.A. Kendi and F.J. Doyle III, "Nonlinear Internal Model Control for Systems with Measured Disturbances and Input Constraints", *Ind. & Eng. Chem. Res.*, 37, 489-505, 1998.

39. P.A. Wisnewski and F.J. Doyle III, "Control Structure Selection and Model Predictive Control of the Weyerhaeuser Digester Problem", *J. Proc. Control*, **8**, 487-495, 1998.

40. F.J. Doyle III, "Nonlinear Inferential Control for Process Applications", *J. Proc. Control*, **8**, 339-353, 1998.

41. R.S. Parker, F.J. Doyle III, and N.A. Peppas, "A Model-based Algorithm for Blood Glucose Control in Type I Diabetic Patients", *IEEE Trans. Biomed. Eng.*, **46**, 148-157, 1999.

42. F.J. Doyle III, R.S. Parker, and E.P. Gatzke, "Practical Case Studies for Undergraduate Process Dynamics and Control Using the Process Control Modules (PCM)", *Comp. Appl. Eng. Educ.*, **6**, 181-191, 1999.

43. P. Dave, J.F. Pekny and F.J. Doyle III, "Customization strategies for the solution of linear programming problems arising from large scale model predictive control of a paper machine", *J. Proc. Control*, **9**, 385-396, 1999.

44. F.J. Doyle III, "An Anti-Windup Input-Output Linearization Scheme for SISO Systems", *J. Process Control*, **9**, 213-220, 1999.

45. F.J. Doyle III and F. Kayihan "Reaction Profile Control of the Continuous Pulp Digester", *Chem. Eng. Sci.*, **54**, 2679-2688, 1999.

46. Z. Cheng, T.L. Powley, J.S. Schwaber, and F.J. Doyle III, "Projections of the Dorsal Motor Nucleus of the Vagus to Cardiac of Rat Atria: An Anterograde Tracing Study", *J. Comp. Neurology*, **410**, 320-341, 1999.

47. E. Gatzke, R. Vadigepalli, E.S. Meadows, and F.J. Doyle III, "Experiences with an Experimental Project in a Graduate Control Course" *Chem. Eng. Education*, **33**, 270-275, 1999.

48. K. Podual, F.J. Doyle III, and N.A. Peppas, "Dynamic Behavior of Glucose-Oxidase-containing Microparticles of Poly(ethylene glycol)-grafted Cationic Hydrogels in an Environment of Changing pH", *Biomaterials*, **21**, 1439-1450, 2000.

49. K. Podual, F.J. Doyle III, and N.A. Peppas, "Preparation and Dynamic Response of Cationic Copolymer Hydrogels Containing Glucose Oxidase", *Polymer*, **41**, 3975-3983, 2000.

50. K. Podual, F.J. Doyle III, and N.A. Peppas, "Glucose Sensitivity of Glucose-Oxidase-containing Cationic Copolymer Hydrogels Having Poly(ethylene glycol) Grafts", *J. Controlled Release*, **67**, 9-17, 2000.

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Semibatch Emulsion Polymerization by Surfactant Addition", *J. Process Control*, **10**, 419-432, 2000.

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PLENARY LECTURES

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"Control Issues in Biosystems", *Otomatik Kontrol Ulusal Toplantisi (Turkish Automatic Control Conference),* Ankara, Turkey, September 2002.

"Modeling, Simulation, and Optimization Issues in the Control of Particulate Processes", *International Symposium on Process Systems Engineering and Control*, Bombay, India, January 2003.

"Systems Biology: Control and Regulation", *Int. Symp. on Advanced Control of Chemical Processes*, Hong Kong, January 2004.

"Modeling and Analysis Challenges in Systems Biology: A Control Perspective", *Int. Conference on Computer Applications in Biotechnology*, Nancy, France, March, 2004.

"Robustness Analysis of Biological Circuits: Application to Circadian Clock Networks", *SIAM Conference on Control and Its Applications*, San Francisco, June, 2007.

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"Nonlinear Process Control: Which Way to the Promised Land?", F. Allgower (speaker) and F. Doyle, *Chemical Process Control V*, Lake Tahoe, CA, January 1996.

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"Nonlinear Inferential Control for Process Applications*", Int. Symp. on Advanced Control of Chemical Processes*, Banff, Canada, June 1997.

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"A Systems Approach to Modeling and Analyzing Biological Regulation", *NAS Beckman Frontiers of Science Symposium*, Irvine, CA, November 2002.

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"Process Control – From the Chemical Industry to Systems Biology", *New Trends in Industrial Automation and IT,* Vasteras, Sweden, June, 2005.

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"Nonlinear Approaches to Industrial Process Control," University of Illinois, Champagne-Urbana, IL, November 1992.

"Nonlinear Modeling and Control of a Packed Bed Reactor," Hercules Research Center, Wilmington, DE, January 1993.
"Computer Integrated Process Operations," Weyerhaeuser Technical Center, Tacoma, WA, May 1993.

"Identification and Control Strategies for Nonlinear Model Predictive Control Using Volterra Series Approximations," Stuttgart University, Stuttgart, Germany, July 1993.

"Approximation Approaches to Nonlinear Model-based Control," Dow Chemical Company, Freeport, TX, February 1994.

"Reverse Engineering Biological Control Systems for Applications in Process Operations," Auburn University, Auburn, AL, April 1994.

"Reverse-Engineering Biological Control Systems for Applications in Process Operations," Arizona State University, Tempe, AZ, October, 1994.

"Novel Control Techniques from Biological Inspiration", panelist at Neural Information Processing Systems (NIPS) Workshop, Vail, CO, December, 1994.

"Opportunities for Process Control through Neuromimetics: the Reverse Engineering of Biological Reflexes", University of Michigan, Ann Arbor, MI, March 1995.

"A Biologically Motivated Dynamic Nonlinear Scheduling Algorithm for Control", GM Research Center, Warren, MI, March 1995.

"Application of Large-Scale MPC to Paper Machines", Weyerhaeuser Company, Seattle, WA, June 1995.

"Reverse Engineering a Biological Reflex for Applications in Process Control", University of Cincinnati, Cincinnati, OH, February 1996.

"Neuromorphic Engineering: Unraveling a Biological Reflex for Applications in Process Control", Queen's University, Kingston, Canada, April 1996.

"Plant Design for Operability: An Introduction to the Available Mathematical Tools", AIChE/ISA Technochem '96, Houston, TX, May 1996.

"Identification and Control Strategies for Nonlinear Model-based Control Using Input-Output Approximations", Kyoto University, Kyoto, Japan, July 1996.

"Neuromorphic Engineering: Unraveling a Biological Reflex for Applications in Process Control", University of California, Berkeley, CA, October 1996.

"Novel Approaches to the Robust Control of Complex Chemical Processes through Nonlinear Model-based

Control", University of Delaware, Newark, DE, November 1996.

"Inferential Control of Continuous Digesters using MPC", AspenWorld97, Boston, MA, October 1997.

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"Nonlinear Model-based Control", Air Products, Allentown, PA, January 1998.

"Nonlinear Inferential Process Control", DuPont Company, Newark, DE, January 1998.

"Input Sequence Design for Nonlinear Model Identification", IMA Workshop on Nonlinear Identification and Control, Minneapolis, Minnesota, April, 1998.

"Future Trends in Process Control for the Pulp and Paper Industry", Westvaco, Laurel, PMD, May 1998.

"Nonlinear MPC with Large Scale Fundamental Models: Application to a Continuous Kamyr Digester", Nonlinear MPC Workshop, Ascano, Switzerland, June 1998.

"Computational Issues in the Application of Model-based Control to the Pulp and Paper Industry", Louisiana State University, Baton Rouge, LA, October, 1998.

"Biosystems Analysis and Control: Tools for Building Bridges from Chemical Engineering to Biology", Carnegie Mellon University, Pittsburgh, PA, October, 1998.

"Biosystems Analysis and Control: Tools for Building Bridges from Chemical Engineering to Biology", Georgia Institute of Technology, Atlanta, GA, October, 1998.

"Computational Issues in the Application of Model-based Control to the Pulp and Paper Industry", TAPPI Pulping Conference, Montreal, October, 1998.

"Biosystems Analysis and Control: Tools for Building Bridges from Chemical Engineering to Biology, Texas A & M University, College Station, TX, March, 1999.

"Biosystems Analysis and Control: Tools for Building Bridges from Chemical Engineering to Biology", University of Texas, Austin, TX, March, 1999.

"Biosystems Analysis and Control", ETH Zurich, Switzerland, September, 1999.

"Modeling, Control, and Optimization of Emulsion Polymerization Reactors", Lyon University, Lyon, France, September, 1999.

"Model Predictive Control for Large Scale Problems with Application to the Pulp and Paper Industry", Taiwan University, Taipei, Taiwan, July, 1999.

"Biosystems Analysis and Control: Tools for Building Bridges from Chemical Engineering to Biology", University of Wisconsin, Madison, WI, October, 1999.

"Model-based Control of Particle Size Distribution in Emulsion Polymerization", AspenWorld 2000, Orlando, FL, January 2000.

"Plantwide Control of a Pulp Mill Process", AspenWorld 2000, Orlando, FL, January 2000.

"Sensitivity Analysis and Optimization Studies of an Emulsion Polymerization System", Polymer

Reaction Engineering 2000, Daytona, FL, March 2000.

"Control of Particle Size Distribution in Emulsion Polymerization", University of Pittsburgh, Pittsburgh, PA, April 2000.

"Control-Relevant of Process Nonlinearity", University of Stuttgart, Stuttgart, Germany, June, 2000.

"Nonlinear Inferential Process Control", Swiss Federal Institute of Technology, Lausanne, Switzerland, June, 2000.

"Biosystems Analysis and Control", City College CUNY, New York, NY, October, 2000.

"Biosystems Analysis and Control", Illinois Institute of Technology, Chicago, IL, January, 2001.

"Model-based Approaches to the Control of Particle Size Distribution" University of California, Santa Barbara, CA, April, 2001.

"Model-based Approaches to the Control of Particle Size Distribution" University of Maryland, College Park, MD, May, 2001.

"Systems Biology - A Control Perspective" KOC University, Istanbul, Turkey, October, 2001.

"Systems Biology – New Opportunities for Process Systems Engineering", Institut für Systemtheorie Technischer Prozesse, Unìversìtät Stuttgart, Stuttgart, Germany, December, 2001.

"Issues in Control of Particle Size Distribution" ETH, Zurich, Switzerland, December, 2001.

"Biosystems Analysis and Control" Max Planck Institute, Magdeburg, Germany, December, 2001.

"Population Balance Model-based Control Of Particle Size Distribution in an Emulsion Polymerization Process" Lehrstuhl fur Prozesstechnikder RWTH, Aachen, Germany, January, 2002.

"Systems Biology - A Control Perspective" Imperial College, London, England, February, 2002.

"Modeling and Sensitivity Analysis of PSD in Vinyl acetate-Butyl acrylate Emulsion Polymerization" ETH, Zurich, Switzerland, February, 2002.

"Model-based Approaches to the Control of Particle Size Distribution" University of Thessaloniki, Thessaloniki, Greece, March, 2002.

"Systems Biology - A Control Perspective" Department of Mathematics, University of Wuerzburg, Wuerzburg, Germany, April, 2002.

"Systems Biology - A Control Perspective" Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland, April, 2002.

"Systems Biology - A Control Perspective" Royal Institute of Technology, Stockholm, Sweden, June, 2002.

"Systems Biology – New Opportunities for Process Systems Engineering", Iowa State University, Ames, Iowa, September, 2002.

"Advanced Control of Particulate Processes", University of Queensland, Brisbane, Australia, November, 2002.

"Process and Biosystems Control", Honeywell Technology Center, Minneapolis, Minnesota, November, 2002.

"Model-based Control Strategies for Diabetes Management", Sansum Medical Research Institute, Santa Barbara, California, November, 2002.

"Optimization Issues in Model-based Control of Bioreactors", BIOPHEX, Santa Clara, California, November, 2002.

"Systems Biology – New Opportunities for Systems Engineering", UCSB-Mechanical Engineering, Santa Barbara, March, 2003.

"Systems Identification Concepts in the Reverse Engineering of Gene Networks", Becton-Dickinson, Durham, North Carolina, March, 2003.

"Some 'Systems' Issues in Systems Biology", UCSB-Biomolecular Science and Engineering, Santa Barbara, May, 2003.

"Model-based Control Strategies for Diabetes Management", Entelos, San Francisco, August, 2003.

"Robustness Analysis of the Circadian Rhythm Gene Network in the Fly", Caltech, Pasadena, November, 2003.

"Robustness Analysis of Gene Regulatory Network Underlying Circadian Rhythms", IMA Workshop on Robustness in Complex Systems, Minneapolis, Minnesota, February, 2004.

"Robustness Analysis of the Circadian Rhythm Gene Network in the Fly", MIT, Cambridge, Massachusetts, April, 2004.

"Advances in Model-based Control of Glucose for Diabetes", University of Nevada, Reno, Nevada, April, 2004.

"Process Control Perspective on Agglomeration Control", IFPRI Workshop on Controlled Granulation Processes, Newark, Delaware, June, 2004.

"Identifiability Issues in Modeling Regulatory Networks", NSF/NIH/WTEC Workshop on Systems Biology, Arlington, Virginia, June, 2004.

"Sensitivity Approach to Robustness Analysis in Regulatory Networks", BIRS Workshop on Dynamics, Control and Computation in Biochemical Networks, Banff, Canada, August, 2004.

"Robustness Analysis of the Circadian Rhythm Gene Network in the Fly", Ecole Polytechnic, Montreal, Canada, September, 2004.

"Robustness Analysis of the Circadian Rhythm Gene Network in the Fly", University of Illinois, Urbana, Illinois, September, 2004.

"Sensitivity Approaches to Identification and Robustness Analysis of Biological Networks ", Workshop on Complexity of Biological Networks, Braunschweig, Germany, October, 2004.

"Systems Biology and Systems Engineering", AIChE Annual Meeting, Austin, Texas, November, 2004.

"Systems Approaches to Robustness Analysis of Circadian Oscillators", National Academies Keck Futures Workshop on Computational Chronobiology, Irvine, California, January, 2005.

"Systems Approaches to Robustness Analysis of Circadian Oscillators", Texas A&M, College Station, Texas, January, 2005.

"Systems Approaches to Robustness Analysis of Circadian Oscillators", Scripps Institute, La Jolla, California, February, 2005.

"Robustness Analysis of the Circadian Rhythm Gene Network in the Fly", Stanford University, Palo Alto, California, May, 2005.

"A Systems Approach to Modeling and Analyzing Biological Systems", Ludwig-Maximilians-University, Munich, Germany, June, 2005.

"A Systems Approach to Modeling and Analyzing Biological Systems", National Technical University, Tapei, Taiwan, August, 2005.

"A Systems Approach to Modeling and Analyzing Biological Systems", Tsinghua University, HsinChu, Taiwan, August, 2005.

"A "Systems" Approach to Modeling and Analyzing Biological Systems", Johns Hopkins University, Baltimore, January, 2006.

"Circadian Rhythm: A Natural, Robust, Multi-Scale Control System", Computer Science Dept., ETH, Zurich, February, 2006.

"Systems Approaches to Robustness Analysis of Circadian Oscillators", Biology Department, Washington University, St. Louis, February, 2006.

"Advanced Control Strategies for Diabetes Management", Mechanical Engineering Department, University of California, Berkeley, September, 2006.

"Robustness Analysis of Biological Circuits: Application to Circadian Clock Networks", Chemical Engineering Department, McMaster University, Canada, February, 2007.

"Systems Approaches to Robustness Analysis of Circadian Clock Networks", Bioengineering Department, UC Irvine, CA, March, 2007.

CONTRIBUTED AND INVITED CONFERENCE PRESENTATIONS

F.J. Doyle III, A.N. Hayhurst, D.B. Kittelson, and N. Collings, "Ionization in the Exhaust of a Spark Ignition Engine", presented at *21st Combustion Institute Symposium*, Munich, 1986.

F.J. Doyle III, A. Packard, and M. Morari, "Controller Design for a Nonlinear CSTR", presented at *SIAM Conference on Control in the 90s*, San Francisco, 1989.

F.J. Doyle III, H.M. Budman, and M. Morari, "Theoretical and Practical Aspects of Nonlinear Packed Bed Reactor Control", presented at *AIChE Annual Meeting*, Chicago, November 1990.

F.J. Doyle III, M. Morari, and J.C. Doyle, "Some Practical Considerations in the Selection of 'Linearizing' Control over Linear Control", presented at *AIChE Annual Meeting*, Los Angeles, November 1991.

J.S. Schwaber, B.A. Ogunnaike, and F.J. Doyle III, "Reverse Engineering Brain Functions for Process Technology", presented at *DuPont Polymers Technical Conference: Process Sensors, Modeling and Control*, Tamiment, PA, June 1992.

R.K. Pearson, T.A. Ogunnaike, and F.J. Doyle III, "Identification of Discrete Convolution Models for Nonlinear Processes", presented at *AIChE Annual Meeting*, Miami, November 1992.

F.J. Doyle III, T.A. Ogunnaike, and R.K. Pearson, "Nonlinear Model Predictive Control Using Second Order Volterra Models", presented at *AIChE Annual Meeting*, Miami, November 1992.

F.J. Doyle III and M. Morari, "Sensitivity of Linear and Feedback Linearizing Controllers to Unmeasured Disturbances", presented at *SIAM Conference on Control and its Applications*, Minneapolis, October 1992.

F.J. Doyle III, "Reverse Engineering Brain Functions for Process Technology", presented at *Neural Information Processing Systems (NIPS) Workshop*, Denver, November 1992.

A.M. Shaw and F.J. Doyle III, "Biologically Motivated Dynamic Neural Networks for Nonlinear Process Modeling", presented at *Purdue University Neuroscience Retreat*, West Lafayette, October 1993.

M. Pawlak, R.K. Pearson, B.A. Ogunnaike, and F.J. Doyle III, "Identification of a Class of Nonlinear Models", presented at *Third World Congress of the Bernoulli Society for Mathematical Statistics and Probability*, Chapel Hill, June, 1994.

F.J. Doyle III, D. Heemstra, H. Kwatra and A.M. Shaw, "Reverse Engineering the Baroreflex for Applications in Process Operations", presented at *Biomedical Engineering Society Annual Meeting*,
Tempe, October, 1994.

P.A. Wisnewski and F.J. Doyle III, "A Model Reduction Scheme for a Pulp Digester", presented at *AIChE Annual Meeting*, San Francisco, November 1994.

T.A. Kendi and F.J. Doyle III, "Approximate Linearized Control for a Fluidized Bed Reactor", presented *AIChE Annual Meeting*, San Francisco, November 1994.

A.M. Shaw and F.J. Doyle III, "A Biologically Motivated Scheme for Nonlinear Process Modeling", presented at *AIChE Annual Meeting*, San Francisco, November 1994.

G. McCullough, B. Maner, F.J. Doyle III, and R.K. Pearson, "Control-Relevant Identification for Volterra Model Predictive Control", presented at *AIChE Annual Meeting*, San Francisco, November 1994.

N.A. Peppas, F.J. Doyle III, and C.M. Dorski, "Recent Developments in Insulin Delivery and Control Using

Hydrogel Systems", presented at *First Spanish-Portuguese Conf. on Controlled Drug Delivery*, Santiago de Compostella, Spain, 1995.

Z. Cheng, T.L. Powley, J.S. Schwaber and F.J. Doyle III, "Vagal Afferent Innervation of the Rat Heart Reconstructed with Laser Confocal Microscopy: Local Reflex Circuits?", presented at *Neuroscience Annual Meeting*, San Diego, November 1995.

A.M. Shaw and F.J. Doyle III, "Nonlinear Control Design Using a Dynamic Neuron Empirical Model", presented at *AIChE Annual Meeting*, Miami, November 1995.

P. Dave, F.J. Doyle III, and J.F. Pekny, "Specialized Mathematical Programming Methods for Model Predictive Control of Large Scale Systems", presented at *AIChE Annual Meeting*, Miami, November 1995.

A. Aoyama, F.J. Doyle III, and V. Venkatasubramanian, "Control-Affine Fuzzy Neural Network Approach for Nonlinear Process Control", presented at *AIChE Annual Meeting*, Miami, November 1995.

H.S. Kwatra and F.J. Doyle III, "Dynamic Gain Scheduled Control", presented at *AIChE Annual Meeting*, Miami, November 1995.

F.J. Doyle III, T.A. Kendi, and V. Venkatasubramanian, "Purdue Control Modules (PCM): A MATLAB-based Package for Undergraduate Process Control", presented at *AIChE Annual Meeting*, Miami, November 1995.

D. Heemstra and F.J. Doyle III, "Nonlinear Model Identification Using 'Plant-Friendly' Input Sequences", presented at *AIChE Annual Meeting*, Chicago, November 1996.

T. Kendi and F.J. Doyle III, "Issues in Direct Synthesis Control Design for Constrained Nonlinear Systems", presented at *AIChE Annual Meeting*, Chicago, November 1996.

L. Balasubramhanya and F.J. Doyle III, "Nonlinear Wave Model for Control of Reactive Distillation Columns", presented at *AIChE Annual Meeting*, Chicago, November 1996.

F.J. Doyle III, R.S. Parker, and V. Venkatasubramanian, "Practical Case Studies for Undergraduate Process Control Using the Purdue Control Modules", presented at *AIChE Annual Meeting*, Chicago, November 1996.

R.S. Parker, F.J. Doyle III, and N.A. Peppas, "Insulin Delivery Using Model-based Control of Infusion Pumps", presented at *AIChE Annual Meeting*, Chicago, November 1996.

K. Podual, N.A. Peppas, and F.J. Doyle III, "Glucose-sensitive, Poly(ethylene glycol)-grafted Copolymer Networks for Feedback Responsive Insulin Delivery", presented at *AIChE Annual Meeting*, Chicago, November 1996.

R.B. McLain, M.J. Kurtz, M.A. Henson, and F.J. Doyle III, "Habituating Control for Non-Square Nonlinear Processes", presented at *AIChE Annual Meeting*, Chicago, November 1996.

F.J. Doyle III, "Incorporation of Realistic Case Studies in an Undergraduate Process Control Course", presented at *ASEE Summer School for Chemical Engineering Faculty*, Snowbird, August 1997.

Z. Cheng, T.L. Powley, J.S. Schwaber and F.J. Doyle III, "Dorsal Motor Nucleus of the Vagus (DmnX) Projections to the Rat Heart", presented at *Neuroscience Annual Meeting*, San Diego, November 1997.

K. Podual, F.J. Doyle III, and N. Peppas, "Glucose-sensitive Cationic Hydrogels: Preparation, Characterization and Modeling of Swelling Properties", presented at *AIChE Annual Meeting*, Los Angeles, November 1997.

R.S. Parker, K. Rabinovitch, F.J. Doyle III, and N.A. Peppas, "Control Analysis of Pancreas Models for Optimal Insulin Delivery", presented at *AIChE Annual Meeting*, Los Angeles, November 1997.

E. Gatzke, R.S. Parker, and F.J. Doyle III, "Process Control Modules for MATLAB 5.1", presented at *AIChE Annual Meeting*, Los Angeles, November 1997.

F.J. Doyle III, and B.R. Maner, "Autoregressive plus Volterra Model Structure for Nonlinear Control", presented at *AIChE Annual Meeting*, Los Angeles, November 1997.

R.S. Parker, F.J. Doyle III, and D. Ramkrishna, "Nonlinear Adaptive Horizon-Based Predictive Control of a Bioreactor Using a State-Space Laguerre Model", presented at *AIChE Annual Meeting*, Los Angeles, November 1997.

A. Mahoney, D. Ramkrishna, and F.J. Doyle III, "Growth and Nucleation Rates from Dynamic Particle Size Distributions", presented at *AIChE Annual Meeting*, Miami, November 1998.

R.S. Parker and F.J. Doyle III, "Nonlinear Internal Model Control of a Continuous Bioreactor with Unknown Reaction Pathways", presented at *AIChE Annual Meeting*, Miami, November 1998.

F.J. Doyle III, "A Young Faculty Member's Perspective on Academia", presented at *AIChE Annual Meeting*, Miami, November 1998.

R. Vadigepalli, F.J. Doyle III, W.C. Rose, and J.S. Schwaber, "A Second Messenger Model for Local Cardiac Control", presented at *AIChE Annual Meeting*, Miami, November 1998.

E.S. Meadows, and F.J. Doyle III, "New Optimization Technologies: Applications for MPC", presented at *AIChE Annual Meeting*, Miami, November 1998.

R.S. Parker, F.J. Doyle III, and N.A. Peppas, "Uncertainty and Robustness in Diabetic Patient Blood Glucose Control", presented at *AIChE Annual Meeting*, Miami, November 1998.

E.P. Gatzke, and F.J. Doyle III "Moving Horizon Parameter Estimation Using Qualitative Knowledge and Multiple Linear Models", presented at *AIChE Annual Meeting*, Miami, November 1998.

E.P. Gatzke, R.S. Parker, and F.J. Doyle III "Interactive Multimedia for the Process Control Modules (PCM)", presented at *AIChE Annual Meeting*, Miami, November 1998.

F.J. Doyle III, J. Castro-Velez, and F. Kayihan "A Pulp and Paper Mill-wide Control Problem", presented at *AIChE Annual Meeting*, Miami, November 1998.

F.J. Doyle III, J. Castro-Velez, and F. Kayihan "A Pulp and Paper Mill-wide Control Problem", presented at *AIChE Annual Meeting*, Miami, November 1998.

F.J. Doyle III, "Computational Issues in the Control of Particle Size in an Emulsion Polymerization Reactor", presented at *Control of Particulate Processes VI*, Fraser Island, Australia, September 1999.

R.S. Parker, A. Stamps, N.A. Peppas, and F.J. Doyle III, "Robust H-infinity Control of Type I Diabetic Patient Blood Glucose", presented at *AIChE Annual Meeting*, Dallas, November 1999.

R. Vadigepalli and F.J. Doyle III, "Distributed and Decentralized State Estimation for Large Scale Process Systems", presented at *AIChE Annual Meeting*, Dallas, November 1999.

K. Mahadevan, E.P. Gatzke, and F.J. Doyle III, "Merging Laboratory Experiments with Software Experiments",

presented at *AIChE Annual Meeting*, Dallas, November 1999.

E.S. Meadows, J.J. Castro, D.R. Sa.er, and F.J. Doyle III, "Mathematical Programming Strategies for Linear MPC: Continuity, Stability and Computational Efficiency", presented at *AIChE Annual Meeting*, Dallas, November 1999.

A. Mahoney, F.J. Doyle III, and D. Ramkrishna, "Data-Driven Modeling of Particulate Growth and Nucleation", presented at *AIChE Annual Meeting*, Dallas, November 1999.

A. Mahoney, F.J. Doyle III, and D. Ramkrishna, "An Efficient Finite Element Technique for Precipitation Dynamics", presented at *AIChE Annual Meeting*, Dallas, November 1999.

J.J. Castro and F.J. Doyle III, "Plantwide Control of the Fiber Line of a Pulp Mill", presented at *AIChE Annual Meeting*, Dallas, November 1999.

L. Puig and F.J. Doyle III, "Dynamic Modeling of a Continuous Pulp Digester During Hardwood/Softwood Grade Transitions", presented at *AIChE Annual Meeting*, Dallas, November 1999.

E.P. Gatzke and F.J. Doyle III, "Moving Horizon Estimation and Control of an Experimental Process", presented at *AIChE Annual Meeting*, Dallas, November 1999.

T. Crowley, J. Varner, and F.J. Doyle III, "Cybernetic Model Based Control: Application to the Production of Storage Metabolites", presented at *AIChE Annual Meeting*, Dallas, November 1999.

F.J. Doyle III, "Biosystems Analysis and Control - The Early Influence of Dave Smith's Group at DuPont", presented at *AIChE Annual Meeting*, Dallas, November 1999.

G.M. Hanket, P.D. Paulson, U. Singh, S.T. Junker, R.W. Birkmire, F.J. Doyle III, E. Eser, and W.N. Shafarman, "Fabrication of Graded Cu(InGa)Se_2 Films by Inline Evaporation", *28th IEEE Photovoltaics Specialists Conference*, Anchorage, September, 2000.

R. Vadigepalli and F.J. Doyle III, "Sensitivity Analysis of Linearizing Local Cardiac Control in the Rat", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

E.P. Gatzke and F.J. Doyle III, "Constrained Moving Horizon Control of a Granulation System", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

R. Mahadevan and F.J. Doyle III, "A Flatness-based Approach to On-line Optimization of Fed-batch Bioreactors", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

R. Mahadevan, E.P. Gatzke, and F.J. Doyle III, "Advanced Control Education Through the Integration of Laboratory Experiments and Simulation", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

S. Junker, F.J. Doyle III, and R. Birkmire, "Physical Vapor Deposition of Cu(InGa)Se2 by Co-Evaporation: Modeling for Process Control", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

A. Mahoney, D. Ramkrishna, and F.J. Doyle III, "Observation of Particulate Systems", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

R. Mahadevan and F.J. Doyle III, "Control Relevant Scheduling of Grade Transitions in a Polymerization Reactor", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

E.S. Meadows, E.P. Gatzke, D. Saffer, N. Hernjak, and F.J. Doyle III, " Teaching Multivariable Control with the

4-Tank Experimental Process", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

C. Immanuel and F.J. Doyle III, "Fundamental Modeling of Particle Size Distribution in Emulsion Co-polymerization System", presented at *AIChE Annual Meeting*, Los Angeles, November 2000.

R. Mahadevan and F.J. Doyle III, "Dynamic flux analysis of diauxic growth in E. coli", presented at *BMES Annual Meeting*, Durham, October, 2001.

C.D. Immanuel, F.J. Doyle III, S. Sundaram, and C.F. Cordeiro, "Effect of Surfactant Properties on the Evolution of Particle Size Distribution (PSD) in Emulsion Polymerization", presented at *AIChE Annual Meeting*, Reno, November 2001.

S. Bhartiya, P. DuFour, and F.J. Doyle III, "Thermal-hydraulic Digester Model Using a Higher-Order Numerical Method", presented at *AIChE Annual Meeting*, Reno, November 2001.

C. Owens and F.J. Doyle III, "Model Based Performance Monitoring of Diabetic Patient Systems", presented at *AIChE Annual Meeting*, Reno, November 2001.

N. Hernjak and F.J. Doyle III, "Correlation of Process Nonlinearity with Performance Assessment", presented at *AIChE Annual Meeting*, Reno, November 2001.

R. Mahadevan and F.J. Doyle III, "Control Education by Coupling Software and Laboratory Experiments", presented at *AIChE Annual Meeting*, Reno, November 2001.

R. Mahadevan and F.J. Doyle III, "Optimization of a Fed-batch Bioreactor based on State Transformations", presented at *AIChE Annual Meeting*, Reno, November 2001.

D. Zak, F.J. Doyle III, and J. Schwaber, "Genetic Regulatory Network Simulations for Data Analysis", presented at *DIMACS Workshop on Complexity in Biosystems*, Piscataway, April, 2002.

C.D. Immanuel, S. Sundaram, C.F. Cordeiro, and F.J. Doyle III, "Dynamic modeling of the effect of coagulation in the evolution of particle size distribution in emulsion co-polymerization, under steric stabilization using non-ionic surfactants", presented at *ACS Colloid and Surface Science Symposium*, Ann Arbor, June, 2002.

P. Panjwani, V. Sakizlis, V. Dua, F. J. Doyle III, E. N. Pistikopoulos, "Control and Automation for the Regulation of Blood Glucose in Type I Diabetic Patients via Parametric Programming" presented at *Diabetes Technology*, Atlanta, November, 2002.

C. Owens, F. J. Doyle III, "Inference of Blood Glucose Concentration for Control" presented at *Diabetes Technology*, Atlanta, November, 2002.

F.J. Doyle III, J.S. Edwards, and R. Mahadevan, "Dynamic Flux Analysis of Diauxic Growth in Escherichia Coli", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

Y. Wang, S. Sundaram, F.J. Doyle III, C. Immanuel, and C. Cordeiro, "Reachability Studies for Particle Size Distribution in Emulsion Polymerization", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

C. Immanuel, S. Sundaram, C. Cordeiro, and F.J. Doyle III, "Multiobjective Hierarchical Control of Particle Size Distribution in Semi-batch Emulsion Copolymerization", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

N. Hernjak, E.S. Meadows, J.C. Campbell, and F.J. Doyle III, "Control of Nonlinear Multivariable Processes Using DMCplus with Gain Scheduling", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

F.J. Doyle III and J.H. Lee, "Perspectives on Obtaining Industrial and Academic Research Funding", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

D. Zak, R. Pearson, F.J. Doyle III, and J.S. Schwaber, "Experimental Design in Genetic Regulatory Network Identification: Results From In Silico Studies", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

S.T. Junker, F.J. Doyle III, and R. Birkmire, "Manufacture of Thin-Film Solar Cells: Modeling and Control of Cu(InGa)Se2 Physical Vapor Deposition onto a moving Substrate", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

F.J. Doyle III, D. Zak, J. Stelling, and D. Gilles, "Conservation of Robustness in a Gene Regulatory Network Underlying Circadian Rhythm", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

C. Immanuel and F.J. Doyle III, "Finite Element-based Decomposed Solution Strategy for Particle Size Distribution in Emulsion Polymerization", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

F.J. Doyle III and C. Owens, "Limitations of Subcutaneous Route of Insulin Delivery/Measurement on Control of Blood Glucose Levels", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

P. Panjwani, V. Dua, S. Pistikopoulos, V. Sakizlis, and F.J. Doyle III, "Explicit Model Based Control of Blood Glucose in Type I Diabetic Patients via Parametric Programming", presented at *AIChE Annual Meeting*, Indianapolis, November, 2002.

N. Hernjak and F. J. Doyle III "Control-Relevant Nonlinearity Characterization Using Optimal Control Techniques", ***Sixth Southern California Nonlinear Control Workshop***, UC San Diego, May, 2003.

P. Panjwani, V. Sakizlis, V. Dua, F. J. Doyle III, E. N. Pistikopoulos, "Explicit Robust Model Based Blood Glucose Control under Meal Disturbances for Type I Diabetic Patients" presented at *Diabetes Technology*, San Francisco, November, 2003.

C. Owens, H. Zisser, P. Ospina, L. Jovanovic, and F. J. Doyle III, "Clinical Evaluation of Run-to-run Control of Blood Glucose for Type 1 Diabetic Patients" presented at *Diabetes Technology*, San Francisco, November, 2003.

C. Immanuel and F.J. Doyle III, "Efficient Solution Technique for a Multi-Dimensional Population Balance Model Describing Granulation Processes", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

P. Panjwani, V. Sakizlis, V. Dua, F.J. Doyle III and E.N. Pistokopoulos, "Robust Model Based Control of Blood Glucose in Type I Diabetic Patients under Meal Disturbances", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

D. Feather, D. Harrell, R. Lieberman, and F.J. Doyle III, "Hybrid Approach to Real-time Control of Grade Transitions", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

F.J. Doyle III, "Control Insights for Systems Biology", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

T. Schweickhardt, F. Allgöwer, and F.J. Doyle III**, "**The Optimal Control Law Nonlinearity Measure: Improving Control-relevant Nonlinearity Assessment", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

N. Hernjak and F.J. Doyle III, "Control-Relevant Nonlinearity Analysis of a Diabetic Patient Model", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

F.J. Doyle III, C. Owens, H. Zisser, P. Ospina, and L. Jovanovic, "Run-to-run Control of Blood Glucose for Type 1 Diabetic Patients", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

P. Xu, D. Raden, F.J. Doyle III, and A. Robinson, "Investigation of Cell Stress During Heterologous Protein Expression Using A Green Fluorescent Protein Stress Sensor", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

K. Mayawala, K. Kauffman, F.J. Doyle III, and J. Edwards**, "**Improved Characterization of Metabolic Pathways Using Time Constant Data", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

K. Gadkar, J. Varner, J.S. Edwards, and F.J. Doyle III**, "**Dynamic Flux Balance Analysis Approach for Determination of Metabolic Dynamics", presented at *AIChE Annual Meeting*, San Francisco, November, 2003.

F.J. Doyle III**, "**A Systems Biology Approach to Robustness Analysis of Circadian Rhythm" *Proc. of the IEEE International Symposium on Control, Communications and Signal Processing (ISCCSP04)*, Hammamet, Tunisia, March, 2004

H. Zisser, L. Jovanovic, F.J. Doyle III**,** C. Owens, P. Ospina, J. Mesipam, J. O'Leary, and D. Salmi**, "**The "Euglycemic Diet" Facilitates Euglycemia with Less Insulin in Persons with Type 1 Diabetes", presented at *ADA Annual Meeting*, Orlando, June, 2004.

N. Bagheri, R. Gunawan, and F.J. Doyle III, "Strochastic Sensitivity Analysis of the Circadian Gene Network", presented at *Society for Research on Biological Rhythms*, Whistler, Canada, June, 2004.

R. Gunawan and F.J. Doyle III**, "**Stochasticity Sensitivity Analysis of Cellular Processes", presented at *International Conference on Molecular Systems Biology*, Tahoe, California, August, 2004.

P. Dua, F.J. Doyle III, and E. Pistikopoulos, **"**Multi-objective Model Based Parametric Control of Blood Glucose Concentration in Type 1 Diabetics", presented at *AIChE Annual Meeting*, Austin, Texas, November, 2004.

M.J. Park, M. Dokucu, and F.J. Doyle III**, "**Modeling and Sensitivity Analysis for Molecular Weight Distribution in an Emulsion VAc/BuA Copolymerization Reactor", presented at *AIChE Annual Meeting*, Austin, Texas, November, 2004.

K. Gadkar, R. Mahadevan, J. Edwards, and F.J. Doyle III**, "**Estimating Optimal Profiles of Genetic Alterations using Constraint-based Models", presented at *AIChE Annual Meeting*, Austin, Texas, November, 2004.

K. Gadkar, R. Gunawan, J. Varner, and F.J. Doyle III**, "**Iterative Approach for Model Identification in Systems Biology", presented at *AIChE Annual Meeting*, Austin, Texas, November, 2004.

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