

Curriculum Vitae

Michael A. Henson

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EDUCATION

B.S. Chemical Engineering, University of Colorado, Boulder, Colorado, 1985.

M.S. Chemical Engineering, University of Texas, Austin, Texas, 1988.

Ph.D. Chemical Engineering, University of California, Santa Barbara, California, 1992.

RESEARCH EXPERIENCE

Research Assistant, University of Texas, Austin, Texas, Jan. 1987–1988.

Research Assistant, University of California, Santa Barbara, California, 1989–1992.

Visiting Research Scientist, Advanced Process Control Group, DuPont Company, Wilmington, Delaware, Aug. 1992–1993.

Assistant Professor, Department of Chemical Engineering, Louisiana State University, Baton Rouge, Louisiana, 1994–1999.

Associate Professor, Department of Chemical Engineering, Louisiana State University, Baton Rouge, Louisiana, 1999–2002.

Humboldt Research Fellow, Institute of Biochemical Engineering and Institute for Systems Theory in Engineering, University of Stuttgart, Stuttgart, Germany, 2001–2002.

Associate Professor, Department of Chemical Engineering, University of Massachusetts, Amherst, MA, 2002–2004.

Professor, Department of Chemical Engineering, University of Massachusetts, Amherst, MA, 2004–present.

Director, Center for Process Design and Control, University of Massachusetts, Amherst, MA, 2004–present.

Co-Director, Institute for Massachusetts Biofuels Research (TIMBR), 2007–present.

Visiting Professor, Department of Systems Biology, Harvard Medical School, Boston, MA, January–August, 2009.

AWARDS

Career Development Award, National Science Foundation, 1995.

Cross-Holloway Award for Excellence in Research and Service, Louisiana State University, 1998.

James McLaurin Shivers Professorship, Louisiana State University, 1999.

Research Fellowship, Alexander von Humboldt Foundation, 2001.

College of Engineering Outstanding Senior Faculty Award, 2008.

SELECTED PROFESSIONAL ACTIVITIES

Founding Editor-in-Chief

Processes, 2012–present.

Associate Editor

IEEE Control Systems Society Conference Editorial Board, 1994–1996.

Automatica, 2005–2011.

Journal of Process Control, 2000–present.

IET Systems Biology, 2009–present.

AIChE CAST Division

Director, Computing and Systems Technology (CAST) Division of AIChE, 2001–2003.

Programming Chair, CAST Area 10b, Systems and Process Control, 2003.

Other Activities

Member, Technical Committee on Industrial Process Control, IEEE Control Systems Society, 2002–present.

Member, Technical Committee on Chemical Process Control, International Federation of Automatic Control (IFAC), 2003–present.

Board of Directors, American Automatic Control Council, 2004–2005.

Trustee, Computer Aids for Chemical Engineering (CACHE), 2005–present.

Secretary, Computer Aids for Chemical Engineering (CACHE), 2012–2014.

Conference Organization

Chairman, Chemical Process Control 7, Lake Louise, Alberta, Canada, January 2006.

Chairman, Foundations of Systems Biology in Engineering, Denver, CO, August 2009.

Co-Chairman, Foundations of Systems Biology in Engineering, Santa Barbara, CA, July 2005.

Co-Chairman, Foundations of Systems Biology in Engineering, Tsuruoka, Japan, October 2012.

International Program Chair, Dynamics and Control of Process Systems, India, June–July, 2013

Professional Society Memberships

Senior Member, Institute of Electrical and Electronics Engineers

Member, American Institute of Chemical Engineers

Member, International Society for Pharmaceutical Engineering

Consulting

Alstom Power, Windsor, CT, 2007–2009.

Aramco Services Company, 2012–present.

Dow Chemical Company, Plaquemine, LA, 1995.

ExxonMobil Chemical Company, Baton Rouge, LA, 1997–2003.

Chevron Chemical Company, St. James, LA, 1998.

Gas Technology Institute, Des Plaines, IL, 2002.

Logos Technologies, Arlington, VA, 2009–2010.

SunEthanol/Qteros, Amherst, MA, 2007–2009.

BOOKS AND BOOK CHAPTERS

Books

1. Henson, M. A. and D. E. Seborg (Eds.), *Nonlinear Process Control*, Prentice-Hall, Englewood Cliffs, NJ, 1997.

Book Chapters

1. Doyle, F. J., M. A. Henson, B. A. Ogunnaike, J. S. Schwaber, and I. Rybak, "Neuronal Modeling of the Baroreceptor Reflex with Applications in Process Modeling and Control," in *Neural Systems for Control*, D. L. Elliott (Ed.), Academic Press, New York, NY, 1997.
2. Doyle, F. J. and M. A. Henson, "Nonlinear Systems Theory," in *Nonlinear Process Control*, Michael A. Henson and Dale E. Seborg (Eds.), Prentice-Hall, Englewood Cliffs, NJ, 1997. Prentice-Hall, Englewood Cliffs, NJ, 1997.
3. Henson, M. A. and D. E. Seborg, "Feedback Linearizing Control," in *Nonlinear Process Control*, Michael A. Henson and Dale E. Seborg (Eds.), Prentice-Hall, Englewood Cliffs, NJ, 1997.
4. Hjersted, J. and M. A. Henson, "Determining Metabolite Production Capabilities of *Saccharomyces cerevisiae* using Dynamic Flux Balance Analysis," in *Methods in Bioengineering: Systems Analysis of Biological Networks*, Arul Jayaraman and Juergen Hahn (Eds.), Artech House, Boston, MA, 149–178, 2009.
5. Henson, M. A., "Model-Based Control of Biochemical Reactors," in *The Control Handbook*, 2nd edition, William Levine (Ed.), Taylor and Francis, New York, NY, 2010.

REFERRED PUBLICATIONS

Process Modeling and Control

1. Henson, M. A. and D. E. Seborg, "Input-Output Linearization of General Nonlinear Processes," *AIChE J.*, **36**, 1753–1757 (1990).
2. Henson, M. A. and D. E. Seborg, "Critique of Exact Linearization Strategies for Process Control," *J. Process Control*, **1**, 122–139 (1991).
3. Henson, M. A. and D. E. Seborg, "An Internal Model Control Strategy for Nonlinear Systems," *AIChE J.*, **37**, 1065–1081 (1991).
4. Henson, M. A. and D. E. Seborg, "Nonlinear Control Strategies for Continuous Fermentors," *Chem. Eng. Sci.*, **47**, 821–835 (1992).
5. Nahas, E. P., M. A. Henson, and D. E. Seborg, "Nonlinear Internal Model Control Strategy for Neural Network Models," *Comput. chem. Engng.*, **16**, 1039–1057 (1992).
6. Henson, M. A. and D. E. Seborg, "Theoretical Analysis of Unconstrained Nonlinear Model Predictive Control," *Int. J. Control*, **58**, 1053–1080 (1993).
7. Henson, M. A. and D. E. Seborg, "Time Delay Compensation for Nonlinear Processes," *Ind. Eng. Chem. Res.*, **33**, 1493–1500 (1994).
8. Henson, M. A. and D. E. Seborg, "Adaptive Nonlinear Control of a pH Neutralization Process," *IEEE Trans. Control Systems Technology*, **2**, 169–182 (1994).

9. Henson, M. A., B. A. Ogunnaike, J. S. Schwaber, and F. J. Doyle, "The Baroreceptor Reflex: A Biological Control System with Applications in Chemical Process Control," *Ind. Eng. Chem. Res.*, **33**, 2453–2466 (1994).
10. Henson, M. A., B. A. Ogunnaike, and J. S. Schwaber, "Habituating Control Strategies for Process Control," *AIChE J.*, **41**, 604–618 (1995).
11. Meadows, E. S., M. A. Henson, J. W. Eaton, and J. B. Rawlings, "Receding Horizon Control and Discontinuous State Feedback Stabilization," *Int. J. Control*, **62**, 1217–1229 (1995).
12. Pottmann, M., M. A. Henson, B. A. Ogunnaike, and J. S. Schwaber, "A Parallel Control Strategy Abstracted from the Baroreceptor Reflex," *Chem. Eng. Sci.*, **51**, 931–945 (1996).
13. McLain, R. B., M. J. Kurtz, M. A. Henson, and F. J. Doyle III, "Habituating Control for Non-Square Nonlinear Systems," *Ind. Eng. Chem. Res.*, **35**, 4067–4077 (1996).
14. Kurtz, M. J. and M. A. Henson, "Input-Output Linearizing Control of Constrained Nonlinear Processes," *J. Process Control*, **7**, 3–17 (1997).
15. Henson, M. A. and D. E. Seborg, "Adaptive Input-Output Linearization of a pH Neutralization Process," *Int. J. Adapt. Control Signal Process.*, **11**, 171–200 (1997).
16. Pottmann, M. and M. A. Henson, "Compactly Supported Radial Basis Functions for Adaptive Process Control," *J. Process Control*, **7**, 345–356 (1997).
17. Kurtz, M. J. and M. A. Henson, "Feedback Linearization of Discrete-Time Nonlinear Systems with Input Constraints," *Int. J. Control*, **70**, 603–616 (1998).
18. Kurtz, M. J. and M. A. Henson, "State and Disturbance Estimation for Nonlinear Systems Affine in the Unmeasured Variables," *Comput. chem. Engng.*, **22**, 1441–1459 (1998).
19. Henson, M. A. "Nonlinear Model Predictive Control: Current Status and Future Directions," *Comput. chem. Engng.*, **23**, 187–202 (1998).
20. McLain, R. B., M. A. Henson, and M. Pottmann, "Direct Adaptive Control of Partially Known Nonlinear Systems," *IEEE Transactions on Neural Networks*, **10**, 714–721 (1999).
21. Kurtz, M. J., G.-Y. Zhu and M. A. Henson, "Constrained Output Feedback Control of a Multivariable Polymerization Reactor," *IEEE Transactions on Control System Technology*, **8**, 87–97 (2000).
22. McLain, R. B. and M. A. Henson, "Principal Component Analysis for Nonlinear Model Reference Adaptive Control," *Comput. chem. Engng.*, **24**, 99–110 (2000).
23. Zhu, G.-Y., M. A. Henson, and B. A. Ogunnaike, "A Hybrid Model Predictive Control Strategy for Nonlinear Plant-Wide Control," *J. Process Control*, **10**, 449–458 (2000).
24. McLain, R. B. and M. A. Henson, "Nonlinear Model Reference Adaptive Control with Embedded Linear Models," *Ind. Eng. Chem. Res.*, **39**, 3007–3017 (2000).
25. Zhu, G.-Y., M. A. Henson, and L. Megan, "Dynamic Modeling and Linear Model Predictive Control of Gas Pipeline Networks," *J. Process Control*, **11**, 129–148 (2001).

26. Zhu, G.-Y., M. A. Henson, and L. Megan, "Low-Order Dynamic Modeling of Cryogenic Distillation Columns Based on Nonlinear Wave Phenomenon," *Separation and Purification Technology*, **24**, 467–487 (2001).
27. Zhu, G.-Y and M. A. Henson, "Model Predictive Control of Interconnected Linear and Nonlinear Processes," *Ind. Eng. Chem. Res.*, **41**, 801–816 (2002).
28. Bian, S., M. A. Henson, P. Belanger and L. Megan, "Nonlinear State Estimation and Model Predictive Control of Nitrogen Purification Columns," *Ind. Eng. Chem. Res.*, **44**, 153–167 (2005).
29. Bian, S., S. Khowinij, M. A. Henson, P. Belanger and L. Megan, "Compartmental Modeling of High Purity Air Separation Columns," *Computers and Chemical Engineering*, **29**, 2096–2109 (2005).
30. Khowinij, S., M. A. Henson, P. Belanger and L. Megan, "Dynamic Compartmental Modeling of Nitrogen Purification Columns," *Separation and Purification Technology*, **46**, 95–109 (2005).
31. Bian, S. and M. A. Henson, "Measurement Selection for On-Line Estimation of Nonlinear Wave Models for High Purity Distillation Columns," *Chemical Engineering Science*, **61**, 3210–3222 (2006).
32. Chen, Z., M. A. Henson, P. Belanger and L. Megan, "Nonlinear Model Predictive Control of High Purity Distillation Columns for Cryogenic Air Separation," *IEEE Transactions on Control System Technology*, **18**, 811–821 (2010).

Membrane Separation System Modeling and Optimization

1. Jordan, S. M., M. A. Henson, and W. J. Koros, "The Effects of Carbon Dioxide Conditioning on the Permeation Behavior of Hollow Fiber Asymmetric Membranes," *J. Membrane Sci.*, **54**, 103–118 (1990).
2. Henson, M. A. and W. J. Koros, "Multi-Loop Control of a Pilot-Scale Membrane System for Gas Separations," *Ind. Eng. Chem. Res.*, **33**, 1901–1907 (1994).
3. Qi, R. and M. A. Henson, "Approximate Modeling of Spiral-Wound Gas Permeators," *J. Membrane Science*, **121**, 11–24 (1996).
4. Qi, R. and M. A. Henson, "Modeling of Spiral-Wound Permeators for Multicomponent Gas Separations," *Ind. Eng. Chem. Res.*, **36**, 2320–2331 (1997).
5. Qi, R. and M. A. Henson, "Optimization-Based Design of Spiral-Wound Membrane Systems for CO₂/CH₄ Separations," *Separation and Purification Technology*, **13**, 209–225 (1998).
6. Qi, R. and M. A. Henson, "Optimal Design of Spiral-Wound Membrane Networks for Gas Separations," *J. Membrane Science*, **148**, 71–89 (1998).
7. Qi, R. and M. A. Henson, "Membrane System Design for Multicomponent Gas Mixtures via Mixed-Integer Nonlinear Programming," *Comput. chem. Engng.*, **24**, 2719–2737 (2000).

8. Cao, B. and M. A. Henson, "Modeling of Spiral Wound Pervaporation Modules with Application to the Separation of Styrene/Ethylbenzene Mixtures," *J. Membrane Science*, **197**, 117–146 (2002).
9. Cao, B. and M. A. Henson, "Nonlinear Parameter Estimation for Solution-Diffusion Models of Membrane Pervaporation," *Annals of the New York Academy of Sciences*, **984**, 370–385 (2003).

Polymerization Reactor Modeling

1. Li, R., M. A. Henson and K. J. Kurtz, "Selection of Model Parameters for Off-Line Parameters Estimation," *IEEE Transactions on Control System Technology*, **12**, 402–412 (2004).
2. Li, R., M. A. Henson, A. B. Corripio, K. M. Dooley and K. J. Kurtz, "Dynamic Modeling of Cross-linking and Gelation in Continuous Ethylene-Propylene-Diene Polymers Reactors using Pseudo-Kinetic Constant Approach," *Chem. Eng. Sci.*, **59**, 2297–2313 (2004).
3. Li, R., A. B. Corripio, M. A. Henson and K. J. Kurtz, "On-line State and Parameter Estimation of EPDM Polymerization Reactors," *J. Process Control*, **14**, 837–852 (2004).
4. Gonzalez-Ruiz, R. A., B. Quevedo-Sanchez, R. L. Laurence, E. B. Coughlin and M. A. Henson, "Kinetic Modeling and Parameter Estimation of Slurry Propylene Polymerization using rac-Et(Ind)₂ZrCl₂/MAO," *AIChE J.*, **52**, 1824–1835 (2006).
5. Quevedo-Sanchez, B., E. B. Coughlin and M. A. Henson, "Analysis of the Formation of 4-Butenyl End-Group in Zirconocene Catalyzed Polypropylene," *Journal of Polymer Science Part A: Polymer Chemistry*, **44**, 3724–3728 (2006).
6. Quevedo-Sanchez, B., J. F. Nimmons, B. E. B. Coughlin and M. A. Henson, "Kinetic Modeling of the Effect of MAO/Zr Ratio and Chain Transfer to Aluminum in Zirconocene Catalyzed Propylene Polymerization," *Macromolecules*, **39**, 4306–4316 (2006).

Cellular and Bioreactor Modeling

1. Kurtz, M. J., G.-Y. Zhu, A. Zamamiri, M. A. Henson, and M. A. Hjortso, "Control of Oscillating Microbial Cultures Described by Population Balance Models," *Ind. Eng. Chem. Res.*, **37**, 4059–4070 (1998).
2. Kurtz, M. J., M. A. Henson, and M. A. Hjortso, "Nonlinear Control of Competitive Mixed-Culture Bioreactors via Specific Cell Adhesion," *Canadian J. Chem. Eng.*, **78**, 237–247 (2000).
3. Zhu, G.-Y., A. M. Zamamiri, M. A. Henson and M. A. Hjortso, "Model Predictive Control of Continuous Yeast Bioreactors Using Cell Population Models," *Chem. Eng. Sci.*, **55**, 6155–6167 (2000).
4. Zhang, Y. and M. A. Henson, "Bifurcation Analysis of Continuous Biochemical Reactor Models," *Biotech. Progr.*, **17**, 647–660 (2001).
5. Zhang, Y., A. M. Zamamiri, M. A. Henson and M. A. Hjortso, "Cell Population Models for Bifurcation Analysis and Nonlinear Control of Continuous Yeast Bioreactors," *J. Process Control*, **12**, 721–734 (2002).

6. Zamamiri, A. M., Y. Zhang, M. A. Henson and M. A. Hjortso, "Dynamic Analysis of an Age Distribution Model of Oscillating Yeast Cultures," *Chem. Eng. Sci.*, **57**, 2169–2181 (2002).
7. Daoutidis, P. and M. A. Henson, "Dynamics and Control of Cell Populations in Continuous Bioreactors," *AIChE Symposium Series*, **326**, 274–289 (2002).
8. Mhaskar, P., M. A. Henson and M. A. Hjortso, "Cell Population Modeling and Parameter Estimation of Continuous Cultures of *Saccharomyces cerevisiae*," *Biotech. Progr.*, **18**, 1010–1026 (2002).
9. Henson, M. A., D. Müller and M. Reuss, "Cell Population Modeling of Yeast Glycolytic Oscillations," *Biochemical Journal*, **368**, 433–446 (2002).
10. Zhang, Y., M. A. Henson and Y. Kevrekidis, "Nonlinear Model Reduction for Dynamic Analysis of Cell Population Models," *Chem. Eng. Sci.*, **58**, 429–445 (2003).
11. Henson, M. A., "Dynamic Modeling and Control of Yeast Cell Populations in Continuous Biochemical Reactors," *Comput. chem. Engng.*, **27**, 1185–1199 (2003).
12. Henson, M. A., "Dynamic Modeling of Microbial Cell Populations," *Current Opinion in Biotechnology*, **14**, 460–467 (2003).
13. Henson, M. A., "Modeling the Synchronization of Yeast Respiratory Oscillations," *J. Theoretical Biology*, **231**, 443–458 (2004).
14. Henson, M. A., "Cell Population Modeling of Autonomously Oscillating Yeast Cultures," *Comput. chem. Engng.*, **29**, 645–661 (2005).
15. Henson, M. A., "Biochemical Reactor Modeling and Control: Exploiting Cellular Biology to Manufacture High Value Products," *IEEE Control Syst. Mag.*, **26**, August, 54–62 (2006).
16. Hjersted, J. and M. A. Henson, "Optimization of Fed-Batch Yeast Fermentation using Dynamic Flux Balance Models," *Biotechnology Progress*, **22**, 1239–1248 (2006).
17. Hjersted, J., M. A. Henson and R. Mahadevan, "Genome-Scale Analysis of *Saccharomyces cerevisiae* Metabolism and Ethanol Production in Fed-Batch Culture," *Biotechnology and Bioengineering*, **97**, 1190–1204 (2007).
18. Bold K. A., Y. Zou, I. G. Kevrekidis and M. A. Henson, "Efficient Simulation of Coupled Biological Oscillators through Equation-Free Uncertainty Quantification," *Journal of Mathematical Biology*, **55**, 331–352 (2007).
19. Hjersted, J. and M. A. Henson, "Steady-State and Dynamic Flux Balance Analysis of Ethanol Production by *Saccharomyces cerevisiae*," *IET Systems Biology*, **3**, 167–179 (2009).
20. Kolewe, M. E., M. A. Henson and S. C. Roberts, "Characterization of Aggregate Size in *Taxus* Suspension Cell Culture," *Plant Cell Reports*, **5**, 485–494 (2010).
21. Kambam, P. K. R. and M. A. Henson, "Engineering Bacterial Processes for Cellulosic Ethanol Production," *Biofuels*, **1**, 729–744 (2010).

22. Hanly, T. J. and M. A. Henson, "Dynamic Flux Balance Modeling of Microbial Co-Cultures for Efficient Batch Fermentation of Glucose and Xylose Mixtures," *Biotechnology and Bioengineering*, **108**, 376–385 (2010).
23. Kolewe, M. E., M. A. Henson and S. C. Roberts, "Analysis of Aggregate Size as a Process Variable Affecting Paclitaxel Accumulation in *Taxus* Suspension Cultures," *Biotechnology Progress*, **27**, 1365–1372 (2011).
24. Kolewe, M. E., S. C. Roberts and M. A. Henson, "A Population Balance Equation Model of Aggregation Dynamics in *Taxus* Suspension Cell Cultures," *Biotechnology and Bioengineering*, **109**, 472–482 (2012).
25. Hanly, T. J., M. Urello and M. A. Henson, "Dynamic Flux Balance Modeling of *S. cerevisiae* and *E. coli* Co-cultures for Efficient Consumption of Glucose/Xylose Mixtures," *Applied Microbiology and Biotechnology*, **93**, 2529–2541 (2012).
26. Mahadevan, R. and M. A. Henson, "Genome-based Modeling and Design of Metabolic Interactions in Microbial Communities", *Computational and Structural Biotechnology Journal*, **3**: e201210008. dx.doi.org/10.5936/csbj.201210008 (2012).
27. Hanly, T. J. and M. A. Henson, "Dynamic Metabolic Modeling of a Microaerobic Yeast Co-culture: Predicting and Optimizing Ethanol Production from Glucose/Xylose Mixtures," *Biotechnology for Biofuels*, **6**, 44, doi:10.1186/1754-6834-6-44 (2013).
28. Hanly, T. J. and M. A. Henson, "Dynamic Metabolic Modeling of a Microaerobic Yeast Co-culture: Predicting and Optimizing Ethanol Production from Glucose/Xylose Mixtures," *Biotechnology and Bioengineering*, submitted.

Systems Biology

1. Parker, R. S., F. J. Doyle III and M. A. Henson, "Integration of Biological Systems Content and the Process Dynamics and Control Curriculum," *Chem. Eng. Educ.*, **40**, 181–188 (2006).
2. Venkatasubramanian, R., M. A. Henson and N. S. Forbes, "Incorporating Cellular Metabolism into Growth Models of Multicellular Tumor Spheroids," *J. Theoretical Biology*, **242**, 440–453 (2006).
3. To, T.-L., M. A. Henson, E. D. Herzog and F. J. Doyle III, "A Computational Model for Intercellular Synchronization in the Mammalian Circadian Clock," *Biophysical Journal*, **92**, 3792–3803 (2007).
4. Kambam, P. K. R., M. A. Henson and L. Sun, "Design and Mathematical Modeling of a Synthetic Symbiotic Ecosystem," *IET Systems Biology*, **2**, 33–38 (2008).
5. Venkatasubramanian, R., M. A. Henson and N. S. Forbes, "Integrating Cell Cycle Progression, Drug Penetration and Energy Metabolism to Identify Improved Cancer Therapeutic Strategies," *J. Theoretical Biology*, **253**, 98–117 (2008).
6. Vasalou C., E. D. Herzog and M. A. Henson, "Small World Network Models of Intercellular Coupling Predict Enhanced Synchronization in the Suprachiasmatic Nucleus," *Journal of Biological Rhythms*, **24**, 243–254 (2009).

7. Vasalou C. and M. A. Henson, "A Multiscale Model to Investigate Circadian Rhythmicity of Pacemaker Neurons in the Suprachiasmatic Nucleus," *PLOS Computational Biology*, **6**: e1000706. doi:10.1371/journal.pcbi.1000706 (2010).
8. Venkatasubramanian, R., R. B. Arenas, M. A. Henson and N. S. Forbes, "Mathematical Modeling with Dynamic Magnetic Resonance Images Predicts that Tumor Heterogeneity Decreases Therapeutic Response," *British Journal of Cancer*, **103**, 486–497 (2010).
9. Vasalou, C., E. D. Herzog and M. A. Henson, "Multicellular Model for Intercellular Synchronization in Circadian Neural Networks," *Biophysical Journal*, **101**, 12–20 (2011).
10. Vasalou, C. and M. A. Henson, "A Multicellular Model for Differential Regulation of Circadian Signals in the Shell and Core Regions of the SCN," *Journal of Theoretical Biology*, **288**, 44–56 (2011).
11. Henson, M. A., "Multicellular Models of Intercellular Synchronization in Circadian Neural Networks," *Chaos, Solitons and Fractals*, **50**, 48–64 (2013).
12. Su, J. and M. A. Henson, "Circadian Gating of the Mammalian Cell Cycle Restriction Point: A Mathematical Analysis," *PLOS Computational Biology*, submitted.

Colloidal Process Modeling

1. Raikar N., S. R. Bhatia, M. F. Malone and M. A. Henson, "Self-Similar Inverse Population Balance Modeling for Turbulently Prepared Batch Emulsions: Sensitivity to Measurement Errors," *Chemical Engineering Science*, **61**, 7421–7435 (2006).
2. Raikar N., S. R. Bhatia, M. F. Malone and M. A. Henson, "Experimental Studies and Population Balance Equation Modeling of Emulsion Drop Breakage," *Chemical Engineering Science*, **64**, 2433–2447 (2009).
3. Raikar N. B., S. R. Bhatia, M. F. Malone, D. J. McClements, C. Almeida-Rivera, P. Bongers and M. A. Henson, "Prediction of Emulsion Drop Size Distributions with Population Balance Equation Models of Multiple Drop Breakage," *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, **361**, 96–108 (2010).
4. Raikar, N. B., S. B. Bhatia, M. F. Malone, D. J. McClements and M. A. Henson, "Predicting the Effect of Pressure on the Drop Size Distributions of Homogenized Emulsions," *Industrial Engineering and Chemistry Research*, **50**, 6089–6100 (2011).
5. Maindarkar, S., N. B. Raikar and M. A. Henson, "Incorporating Drop Coalescence in Population Balance Equation Model for High Pressure Homogenization," *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, **396**, 63–73 (2012).
6. Yang, Y., A. Corona III and M. A. Henson, "Experimental Investigation and Population Balance Equation Modeling of Solid Lipid Nanoparticle Aggregation Dynamics," *Journal of Colloids and Interface Science*, **374**, 297–307 (2012).
7. Maindarkar, S., P. Bongers and M. A. Henson, "Predicting the Effects of Surfactant Coverage on Drop Size Distributions of Homogenized Emulsions," *Chemical Engineering Science*, **89**, 102–114 (2013).

8. Atmuri, A., M. A. Henson and N. B. Raikar, "Predicting Regimes of Controlled Nanoparticle Aggregation," *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, submitted.

CONFERENCE PROCEEDINGS

1. Henson, M. A. and D. E. Seborg, "Nonlinear Control Strategies for Continuous Fermentors," Proc. American Control Conf., San Diego, CA, 2723–2728 (1990).
2. Henson, M. A. and D. E. Seborg, "A Critique of Differential Geometric Control Strategies for Process Control," Proc. 11th IFAC World Congress, Tallinn, Estonia, **8**, 1–8 (1990).
3. Henson, M. A. and D. E. Seborg, "Time Delay Compensation for Nonlinear Processes," Proc. IFAC DYCORN+92 Symposium, College Park, MD, 151–156 (1992).
4. Henson, M. A. and D. E. Seborg, "Nonlinear Adaptive Control of a pH Neutralization Process," Proc. American Control Conf., Chicago, IL, 2586–2590 (1992).
5. Henson, M. A., M. Pottmann, B. A. Ogunnaike, and J. S. Schwaber, "Reverse Engineering the Parallel Control Architecture of the Baroreceptor Reflex for Process Control Applications," Proc. IFAC Symposium on Modeling and Control in Biomedical Systems, Galveston, TX, 129–130 (1994).
6. Pottmann, M., M. A. Henson, B. A. Ogunnaike, and J. S. Schwaber, "A Parallel Control Strategy Abstracted from the Baroreceptor Reflex," Proc. American Control Conf., Baltimore, MD, 97–101 (1994).
7. Kurtz, M. J. and M. A. Henson, "Nonlinear Output Feedback Control of Chemical Reactors," Proc. American Control Conf., Seattle, WA, 2667–2671 (1995).
8. Henson, M. A. and M. J. Kurtz, "Feedback Linearizing Controller Design for Chemical Processes: Challenges and Recent Advances," Proc. IFAC Symposium on Nonlinear Control Systems Design, Lake Tahoe, CA, 184–189 (1995).
9. Pottmann, M. and M. A. Henson, "Compactly Supported Radial Basis Functions for Adaptive Process Control," Proc. European Control Conf., Rome, Italy, 2345–2350 (1995).
10. Kurtz, M. J. and M. A. Henson, "Linear Model Predictive Control of Input-Output Linearized Processes with Constraints," Proc. Chemical Process Control - V, Lake Tahoe, CA, 335–338 (1996).
11. McLain, R. B. and M. A. Henson, "An Adaptive Nonlinear Control Strategy Derived from a Biological Control System," Proc. IEEE Southeastern Symposium on System Theory, Baton Rouge, LA, 66–70 (1996).
12. Kurtz, M. J. and M. A. Henson, "Feedback Linearizing Control of Discrete-Time Nonlinear Systems with Constraints," Proc. IEEE Southeastern Symposium on System Theory, Baton Rouge, LA, 23–27 (1996).
13. McLain, R. B., M. J. Kurtz, M. A. Henson, and F. J. Doyle, "Habituating Control for Non-Square Nonlinear Processes," Proc. IEEE International Conference on Control Applications, Dearborn, MI, 273–278 (1996).

14. Kurtz, M. J., M. A. Henson, and M. A. Hjortso, "Nonlinear Control of Competitive Mixed-Culture Bioreactors via Specific Cell Adhesion," Proc. IEEE International Conference on Control Applications, Dearborn, MI, 504–509 (1996).
15. Kurtz, M. J. and M. A. Henson, "Constrained Output Feedback Control of a Multivariable Polymerization Reactor," Proc. American Control Conf., Albuquerque, NM, 2950–2954 (1997).
16. Kurtz, M. J. and M. A. Henson, "Stability Analysis of a Feedback Linearizing Control Strategy for Constrained Nonlinear Systems," Proc. American Control Conf., Albuquerque, NM, 3480–3484 (1997).
17. McLain, R. B., M. Misra, M. A. Henson, and M. Pottmann, "Direct Adaptive Control of Partially Known Nonlinear Systems," Proc. IFAC Symposium on Advanced Control of Chemical Processes, Banff, Canada, 403–408 (1997).
18. Henson, M. A., "A Critical Review of Constraint Compensation Techniques for Nonlinear Process Control," Proc. European Control Conf., Brussels, Belgium (1997).
19. McLain, R. B. and M. A. Henson, "Process Applications of a Nonlinear Adaptive Control Strategy Based on Radial Basis Function Networks," Proc. American Control Conf., Philadelphia, PA, 2098–2102 (1998).
20. M. A. Henson and R. Qi, "Optimal Design of Membrane Systems for Gas Separations," Proc. 16th Membrane Technology/Separations Planning Conference, Newton, MA (1999).
21. Zhu, G.-Y., M. A. Henson, and B. A. Ogunnaike, "A Hybrid Model Predictive Control Strategy for Nonlinear Plant-Wide Control," Proc. 14th IFAC World Congress, Beijing, China, 37–42 (1999).
22. Zhang, Y. and M. A. Henson, "A Performance Measure for Constrained Model Predictive Controllers," Proc. European Control Conf., Karlsruhe, Germany (1999).
23. Zhu, G.-Y., A. M. Zamamiri, M. A. Henson and M. A. Hjortso "A Model Predictive Control Strategy for Stabilization of Oscillating Yeast Cultures," Proc. IFAC Symposium on Advanced Control of Chemical Processes, Pisa, Italy, 219–224 (2000).
24. Zhang, Y., G.-Y. Zhu, A. M. Zamamiri, M. A. Henson and M. A. Hjortso, "Bifurcation Analysis and Control of Yeast Cultures in Continuous Bioreactors," Proc. American Control Conf., Chicago, IL, 1742–1746 (2000).
25. Daoutidis, P. and M. A. Henson, "Dynamics and Control of Cell Populations in Continuous Bioreactors," Proc. Chemical Process Control - VI, Tucson, AZ, 308–325 (2001).
26. Zhang, Y., A. M. Zamamiri, M. A. Henson and M. A. Hjortso, "Bifurcation Analysis for Discrimination of Budding Yeast Models," Proc. Int. Conf. on Computer Applications in Biotechnology, Quebec City, Canada, 109–114 (2001).
27. Mhaskar, P., A. M. Zamamiri, M. A. Henson and M. A. Hjortso, "A Cell Population Model with Structured Medium for Budding Yeast Cultures," Proc. Int. Conf. on Computer Applications in Biotechnology, Quebec City, Canada, 97–102 (2001).

28. Henson, M. A. “Dynamic Modeling and Control of Yeast Cell Populations in Continuous Biochemical Reactors,” Proc. Second Pan American Workshop on Process Systems Engineering, Guarujá, Brazil (2002).
29. Zhang, Y., M. A. Henson and Y. Kevrekidis, “Nonlinear Order Reduction of Discretized Cell Population Models,” Proc. American Control Conf., Denver, CO, 2383–2388 (2003).
30. Henson, M. A., “Distribution Control of Particulate Systems Based on Population Balance Equation Models,” Proc. American Control Conf., Denver, CO, 3967–3972 (2003).
31. Henson, M. A., D. Müller and M. Reuss, “Combined Metabolic and Cell Population Modeling for Yeast Bioreactor Control,” Proc. IFAC Symposium on Advanced Control of Chemical Processes, Hong Kong (2004).
32. Meyer, Howard S. and M. A. Henson, “Methane Selective Membranes for Nitrogen Removal from Low Quality Natural Gas – High Permeability is Not Enough,” Proc. Natural Gas Technologies II: Ingenuity and Innovation, Phoenix, AZ (2004).
33. Khowinij, S., S. Bian, M. A. Henson, P. Belanger and L. Megan, “Reduced-Order Modeling of High Purity Distillation Columns for Nonlinear Model Predictive Control,” Proc. American Control Conf., Boston, MA (2004).
34. Parker, R. S., F. J. Doyle III and M. A. Henson, “Integration of Biological Systems Content into the Process Dynamics and Control Curriculum,” Proc. IFAC Symposium on Dynamics and Control of Process Systems, Cambridge, MA (2004).
35. Hjersted, J. and M. A. Henson, “Population Modeling for Ethanol Productivity Optimization in Fed-Batch Yeast Fermenters,” Proc. American Control Conf., Portland, OR (2005).
36. To, T., M. A. Henson and F. J. Doyle III, “Modeling the Synchronization of Biochemically Coupled Circadian Oscillators,” Proc. Foundations of Systems Biology and Engineering, Santa Barbara, CA (2005).
37. Hjersted, J., M. A. Henson and R. Mahadevan, “Validation of a *Saccharomyces cerevisiae* Dynamic Flux Balance Model and Analysis of Metabolism and Ethanol Production in Fed-Batch Culture,” Proc. Foundations of Systems Biology and Engineering, Stuttgart, Germany (2007).
38. Henson, M. A. “Molecular Level Modeling and Dynamic Systems Analysis of Coupled Multicellular Systems,” Proc. Foundations of Systems Biology and Engineering, Stuttgart, Germany (2007).
39. Vasalou C. and M. A. Henson, “An Integrate-and-Fire Model to Investigate Circadian Rhythmicity of Pacemaker Neurons in the Suprachiasmatic Nucleus,” Proc. Foundations of Systems Biology and Engineering, Denver, CO (2009).

INVITED PRESENTATIONS

1. Henson, M. A. and D. E. Seborg, “A Critique of Differential Geometric Control Strategies for Process Control,” 11th IFAC World Congress, Tallin, Estonia, August 1990.

2. Henson, M. A., "An Internal Model Control Strategy for Nonlinear Single-Input, Single-Output Systems," Control Group Seminar, Department of Electrical and Computer Engineering, University of Illinois, Urbana, IL, November 1990.
3. Henson, M. A., "Theoretical Analysis of Nonlinear Model Predictive Control," Control Group Seminar, Department of Chemical Engineering, California Institute of Technology, Pasadena, CA, August 1991.
4. Henson, M. A., "Theoretical Analysis of Nonlinear Model Predictive Control," DuPont Experimental Station, Wilmington, DE, January 1992.
5. Henson, M. A., "An Internal Model Control Strategy for Nonlinear Single-Input, Single-Output Systems," Department of Chemical Engineering, New Jersey Institute of Technology, Newark, NJ, May 1992.
6. Henson, M. A., "An Overview of Advanced Process Control," Local AIChE Section, Baton Rouge, LA, September 1993.
7. M. A. Henson, "Recent Advances in Nonlinear Process Identification and Control," Exxon Chemical Plant, Baton Rouge, LA, March 1996.
8. M. A. Henson, "Advanced Process Design and Control," Praxair, Tonawanda, NY, March 1997.
9. Henson, M. A., "A Distributed Control System for Undergraduate Process Control Education," ASEE Summer School for Chemical Engineering Faculty, Snowbird, UT, August 1997.
10. Henson, M. A., "Advanced Process Design and Control," Department of Chemical Engineering, University of Arizona, Tucson, AZ, October 1997.
11. Henson, M. A., "Radial Basis Function Networks for Nonlinear Model Reference Adaptive Control," DuPont Experimental Station, Wilmington, DE, January 1998.
12. Henson, M. A., "Control of Constrained Nonlinear Processes," Department of Chemical Engineering, University of Colorado, Boulder, CO, February 1998.
13. Henson, M. A., "Nonlinear Model Predictive Control," NSF/NIST Workshop on Process Measurement and Control, New Orleans, LA, March 1998.
14. Henson, M. A., "Control of Constrained Nonlinear Processes," Department of Chemical Engineering, Texas A&M University, College Station, TX, April 1998.
15. Henson, M. A. and R. Qi, "Optimal Design of Membrane Systems for Gas Separations," Proc. 16th Membrane Technology/Separations Planning Conference, Newton, MA, December 1998.
16. Henson, M. A., "Plant-Wide Control via Integration of Linear and Nonlinear Model Predictive Control," DuPont Experimental Station, Wilmington, DE, January 1999.
17. Henson, M. A., "Population Models for Simulation and Control of Oscillating Yeast Cultures," Control Group Seminar, Department of Chemical Engineering, University of Delaware, Newark, DE, January 1999.

18. Henson, M. A., “Dynamic Modeling and Linear Model Predictive Control of Gas Pipeline Networks,” DuPont Experimental Station, Wilmington, DE, January 2000.
19. Henson, M. A., “Nonlinear State Estimation for Ethylene-Proylene-Diene Polymer Reactors,” Control Group Seminar, Department of Chemical Engineering, University of Delaware, Newark, DE, January 2000.
20. Henson, M. A., “Population Balance Equation Models for Simulation and Control of Budding Yeast Cultures,” Institute for Systems Theory in Engineering, University of Stuttgart, Stuttgart, Germany, June 2000.
21. Henson, M. A., “Modeling and Control of Continuous Bioreactors,” Control 2000 Symposium, Champaign, Illinois, July 2000.
22. Daoutidis, P. and M. A. Henson, “Dynamics and Control of Cell Populations in Continuous Bioreactors,” Chemical Process Control - VI, 308–325, Tucson, AZ, January 2001.
23. Henson, M. A. “Dynamic Modeling and Control of Yeast Cell Populations in Continuous Biochemical Reactors,” Second Pan American Workshop on Process Systems Engineering, Guarujá, Brazil, September 2001.
24. Henson, M. A., “Reduced-Order Modeling and Control of Yeast Cell Populations in Continuous Bioreactors,” Institute for Systems Theory in Engineering, University of Stuttgart, Stuttgart, Germany, January 2002.
25. Henson, M. A., “Dynamic Modeling and Control of Yeast Cell Populations in Continuous Biochemical Reactors,” Department of Chemical Engineering, University of Massachusetts, Amherst, MA, January 2002.
26. Henson, M. A., “Dynamic Modeling and Control of Yeast Cell Populations in Continuous Biochemical Reactors,” Automatic Control Laboratory, Swiss Institute of Technology, Lausanne, Switzerland, February 2002.
27. Henson, M. A., “Cell Population Modeling and Parameter Estimation of Yeast Cell Cycle Related Oscillations,” Institute of Biochemical Engineering, University of Stuttgart, Stuttgart, Germany, March 2002.
28. Henson, M. A., “Cell Population Dynamics from Ensembles of Single Cell Models,” Computer Aided Process Engineering Center, Technical University of Denmark, Lyngby, Denmark, May 2002.
29. Henson, M. A., “Optimal Design of Membrane Systems for Gas Separations,” Process Development Group, Eindhoven University of Technology, Eindhoven, Netherlands, May 2002.
30. Henson, M. A., “Cell Population Models for Continuous Yeast Bioreactors,” Department of Chemical Engineering, University of Pittsburgh, Pittsburgh, PA, October 2002.
31. Henson, M. A., “Modeling the Synchronization of Autonomously Oscillating Yeast Cultures,” Department of Chemical Engineering, University of South Carolina, Columbia, SC, October 2003.

32. Henson, M. A., "Modeling the Synchronization of Autonomously Oscillating Yeast Cultures," Department of Chemical and Biomolecular Engineering, University of Illinois, Urbana, IL, November 2003.
33. Henson, M. A., "Cell Population Balance Equation Models for Analysis and Control of Continuous Yeast Fermentors," Department of Chemical Engineering, University of Sydney, Australia, January 2004.
34. Henson, M. A., "Modeling the Synchronization of Autonomously Oscillating Yeast Cultures," Centre for Complex Dynamic Systems and Control, University of Newcastle, Australia, January 2004.
35. Henson, M. A., "Distribution Control of Particulate Systems," Center for Control Engineering and Computation, University of California, Santa Barbara, CA, February 2004.
36. Henson, M. A., "Modeling the Synchronization of Yeast Autonomous Oscillations," Department of Chemical and Biological Engineering, Rensselaer Polytechnic Institute, September 2004.
37. Henson, M. A., "Modeling the Synchronization of Yeast Autonomous Oscillations," Process Systems Engineering Laboratory, Massachusetts Institute of Technology, April 2005.
38. Henson, M. A., "Modeling the Synchronization of Yeast Autonomous Oscillations," Centre for Process Systems Engineering, Imperial College, United Kingdom, June 2005.
39. Henson, M. A., "Nonlinear Modeling and Predictive Control of Cryogenic Air Separation Columns," Praxair Technology Center, Tonawanda, NY, September 2006.
40. Henson, M. A., "Genome-Scale Analysis of *Saccharomyces cerevisiae* Metabolism and Ethanol Production in Batch and Fed-Batch Culture," Department of Chemical Engineering, University of Texas, November 2006.
41. Henson, M. A., "Genome-Scale Analysis of *Saccharomyces cerevisiae* Metabolism and Ethanol Production in Batch and Fed-Batch Culture," Department of Chemical and Biological Engineering, Tufts University, November 2006.
42. Henson, M. A., "Optimization of Fed-Batch Yeast Bioreactors using Dynamic Flux Balance Models," Department of Chemical Engineering, West Virginia University, December 2006.
43. Henson, M. A., "Genome-Scale Analysis of *Saccharomyces cerevisiae* Metabolism and Ethanol Production in Batch and Fed-Batch Culture," Department of Chemical and Biomolecular Engineering, University of Maryland, March 2007.
44. Henson, M. A., "Nonlinear Modeling and Predictive Control of Cryogenic Air Separation Columns," Alstom Power Plant Laboratories, Windsor, CT, March 2007.
45. Henson, M. A., "Molecular Level Modeling and Dynamic Systems Analysis of Coupled Multicellular Systems", Foundations of Systems Biology and Engineering, Stuttgart, Germany, September 2007.

46. Henson, M. A., “Molecular Level Modeling and Dynamic Analysis of Biochemically Coupled Multicellular Systems”, Department of Electrical and Computer Engineering, University of Delaware, November 2007.
47. Henson, M. A., “Multicellular Modeling of Rhythm Generation by the Mammalian Circadian System”, Bauer Forum, Harvard University, March 2008.
48. Henson, M. A., “Dynamic Flux Balance Models for Genome-Scale Analysis and Optimization of Yeast Metabolism”, Department of Chemical Engineering, University of Michigan, September 2008.
49. Henson, M. A., “Dynamic Flux Balance Models for Genome-Scale Analysis and Optimization of Yeast Metabolism”, Department of Chemical and Biochemical Engineering, Rutgers University, October 2008.
50. Henson, M. A., “Metabolic Models for *In Silico* Analysis and Engineering of Microbial Metabolite Production”, Department of Microbiology, University of Massachusetts Amherst, October 2008.
51. Henson, M. A., “Dynamic Flux Balance Models for Genome-Scale Analysis and Optimization of Yeast Metabolism”, Department of Chemical Engineering, Carnegie Mellon University, November 2008.
52. Henson, M. A., “Dynamic Flux Balance Models for Genome-Scale Analysis and Optimization of Yeast Metabolism”, Department of Chemical Engineering, Auburn University, November 2009.
53. Henson, M. A., “Detailed Dynamic Models of Microbial Batch Fermentations”, Bristol-Myers Squibb, New Brunswick, NJ, August 2010.
54. Henson, M. A., “Dynamic Flux Balance Analysis of Pure and Mixed Microbial Cultures,” Department of Chemical and Biomolecular Engineering, Cornell University, February 2011.
55. Henson, M. A., “Predicting Particle Size Distributions in Emulsification and Emulsion Crystallization Processes,” Squishy Physics Seminar Series, Department of Physics, Harvard University, December 2011.
56. Henson, M. A., “Dynamic Metabolic Modeling of Microbial Consortia for Consolidated Ethanol Production,” Center Systems Biology, University of Stuttgart, January 2012.
57. Henson, M. A., “Multicellular Modeling of Intercellular Synchronization in Circadian Neural Networks”, Foundations of Systems Biology and Engineering, Tsuruoka, Japan, October 2012.