

Contents of Volume II – Tuesday and Wednesday Program

Plenary Session 3

- Plenary 3 - Parameter Identification via the Adjoint Method: Application to Protein Regulatory Networks** 475
Claire Tomlin, Stanford University, USA

Keynotes 5 and 6

- Keynote 5 - Modeling of HIV Infection: Vaccine Readiness, Drug Effectiveness and Therapeutical Failures** 485
X. Xia
University of Pretoria
- Keynote 6 - Stability and Controllability of Batch Processes** 493
B. Srinivasan and D. Bonvin
Ecole Polytechnique Fédérale de Lausanne

Session 4.1 - Biomedical Systems Modeling, Analysis and Control

- Identification of Linear Dynamic Models for Type 1 Diabetes: A Simulation Study** 503
D. A. Finan and D. E. Seborg
University of California, Santa Barbara
- Dynamic Modeling of Exercise Effects on Plasma Glucose and Insulin Levels** 509
A. Roy and R. S. Parker, University of Pittsburgh
- Pathways for Optimization-Based Drug Delivery Systems and Devices** 515
L. Bleris, P. Vouzis, M. V. Arnold and M. V. Kothare, Lehigh University
- Flexible Run-to-Run Strategy for Insulin Dosing in Type 1 Diabetic Subjects** 521
C. C. Palerm, H. Zisser, L. Jovanovic and F. J. Doyle, III
University of California, Santa Barbara
- Nonlinear Model Predictive Control for Optimal Discontinuous Drug Delivery** 527
N. Hudon, M. Guay, M. Perrier and D. Dochain
Queen's University

Session 4.2 - Bioprocess Modeling and Identification

- Optimal Experiment Design in Bioprocess Modelling: From Theory to Practice** 535
A. M. Cappuyns, K. Bernaerts, I. Y. Smets, O. Ona, E. Prinsen, J. Vanderleyden and J. F. Van Impe
Katholieke Universiteit Leuven
- Dynamic Modelling of a Biofilter Used for Nitrification of Drinking Water at Low Influent Ammonia Concentrations** 541
Queinnec, J. C. Ochoa, E. Paul and A. VandeWouwer
Le Centre National de la Recherche Scientifique - Faculté Polytechnique de Mons
- Dynamic PCA for Phase Identification of Rifamycin B Fermentation in Multi-Substrate Complex Media** 547
X. T. Doan, R. Srinivasan, P. M. Bapat, and P. P. Wangikar
Institute of Chemical and Engineering Sciences
- A New Model of Phenol Biodegradation and Activated Sludge Growth in Fedbatch Cultures** 553
C. Ben-Youssef, J. Waissman and G. Vázquez
Universidad Politécnica de Pachuca

Session 4.3 - Estimation and Adaptive Control

Tuning an Adaptive Controller using a Robust Control Approach	561
<i>J. Huebsch and H. Budman University of Waterloo</i>	
Parameter Convergence in Adaptive Extremum Seeking Control	567
<i>V. Adetola and M. Guay Queen's University</i>	
Geometric Estimation of Ternary Distillation Columns	573
<i>A. Pulis, C. Fernandez, R. Baratti, and J. Alvarez Universidad Autonoma Metropolitana-Iztapalapa</i>	
Finite Time Observer for Nonlinear Systems	579
<i>F. Sauvage, M. Guay and D. Dochain Queen's University Universite Catholique de Louvain</i>	
Dynamic Estimation and Uncertainty Quantification for Model-Based Control of Discrete Systems	585
<i>J. Gândara, B. Duarte and N. M. C. Oliveira Universidade de Coimbra</i>	

Keynotes 7 and 8

Keynote 7 - Multivariable Controller Performance Monitoring	593
<i>S. J. Qin and J. Yu, University of Texas at Austin</i>	
Keynote 8 - PSE Relevant Issues in Semiconductor Manufacturing: Application to Rapid Thermal Processing	601
<i>C. C. Yu, A. J. Su, J. C. Jeng, H. P. Huang, S. Y. Hung, and C. K. Chao National Taiwan University</i>	

Session 5.1 - Analysis and Control of Separation Processes

Parameter and State Estimation in Chromatographic SMB Processes with Individual Columns and Nonlinear Adsorption Isotherms	611
<i>A. Küpper and S. Engell Universität Dortmund</i>	
Parametric Model Predictive Control of Air Separation	617
<i>J. A. Mandler, N. A. Bozinis, V. Sakizlis, E. N. Pistikopoulos, A. L. Prentice, H. Ratna and R. Freeman, Air Products and Chemicals, Inc</i>	
Stabilizing Control of an Integrated 4-Product Kaibel Column	623
<i>J. Strandberg and S. Skogestad Norwegian University of Science and Technology</i>	
Dynamics and Control of Heat Integrated Distillation Column (HIDIC)	629
<i>T. Fukushima, M. Kano, O. Tonomura and S. Hasebe Kyoto University</i>	
Rigorous Simulation and Model Predictive Control of a Crude Distillation Unit	635
<i>G. Pannocchia, L. Gallinelli, A. Brambilla, G. Marchetti, and F. Trivella University of Pisa</i>	

Session 5.2 - Modeling of Particulate Systems

Challenges of Modelling a Population Balance Using Wavelet	643
<i>J. Utomo, N. Balliu and M. O. Tade Curtin University of Technology</i>	
Development of a Dynamic Multi-Compartment Model for the Prediction of Particle Size Distribution and Molecular Properties in a Catalytic Olefin Polymerization FBR	649
<i>G. Dompazis, V. Kanellopoulos, and C. Kiparissides Aristotle University of Thessaloniki</i>	

Distributional Uncertainty Analysis of a Batch Crystallization Process using Power Series and Polynomial Chaos Expansions	655
<i>Z. K. Nagy and R. D. Braatz, Loughborough University, University of Illinois</i>	
Dynamic Evolution of the Particle Size Distribution in Particulate Processes	661
<i>D. Meimaroglou, A.I. Roussos, and C. Kiparissides Aristotle University of Thessaloniki</i>	
Nonlinear Observer for the Reconstruction of Crystal Size Distributions in Polymorphic Crystallization Processes	667
<i>T. Bakir, S. Othman, G. Fevotte and H. Hammouri Université Claude Bernad Lyon</i>	
Calculation of the Molecular Weight – Long Chain Branching Distribution in Branched Polymers	673
<i>A. Krallis and C. Kiparissides Aristotle University of Thessaloniki</i>	

Session 5.3 - Process Monitoring

A Data-Based Measure for Interactions in Multivariate Systems	681
<i>M. Rossi, A. K. Tangirala, S. L. Shah, and C. Scali University of Alberta</i>	
Issues in On-Line Implementation of a Closed Loop Performance Monitoring System	687
<i>C. Scali, F. Ulivari, and A. Farina University of Pisa</i>	
Steady-State Detection for Multivariate Systems Based on PCA and Wavelets	693
<i>L. Caumo, A. O. Kempf, and J. O. Trierweiler Universidade Federal do Rio Grande do Sul</i>	
Fault Detection Using Projection Pursuit Regression (PPR): A Classification Versus an Estimation Based Approach	699
<i>S. Lou, T. Duever, and H. Budman University of Waterloo</i>	
Fault Detection using Correspondence Analysis: Application to Tennessee Eastman Challenge Problem	705
<i>K. P. Detroja, R. D. Gudi, and S. C. Patwardhan Indian Institute of Technology Bombay</i>	
Using Sub Models for Dynamic Data Reconciliation	711
<i>L. Lachance, A. Desbiens, and D. Hodouin Universite Laval</i>	

Session 6.1 - Modeling and Identification

Control Orientated B-Spline Modelling of a Dynamic MWD System	719
<i>H. Yue, H. Wang, L. Cao University of Manchester</i>	
Prediction of Glycosylation Site-Occupancy Using Artificial Neural Networks	725
<i>R. S. Senger and M. N. Karim Texas Tech University</i>	
Real Time Tracking of Ladle Furnaces: An Analytical Approach	731
<i>J. R. Zabadal, R. L. Garcia, and M. G. Salgueiro Universidade Federal do Rio Grande do Sul</i>	
Solving Water Pollution Problems Using Auto-Bäcklund Transformations	735
<i>J. R. Zabadal, R. L. Garcia, and M. G. Salgueiro Universidade Federal do Rio Grande do Sul</i>	
Identification of Uncertain Wiener Systems	741
<i>J. Figueroa, S. Biagiola and O. Agamennoni Universidad Nacional del Sur</i>	

A Comparative Study of Prediction of Elemental Composition of Coal using Empirical Modelling	747
<i>A. Saptoro, H.B. Vuthaluru and M.O. Tade , Curtin University of Technology</i>	
Energy Based Discretization of an Adsorption Column	753
<i>A. Baaiu, F. Couenne, L. Lefevre, Y. Le Gorrec and M. Tayakout Université Lyon,Le Centre National de la Recherche Scientifique</i>	
Inference of Oil Content in Petroleum Waxes by Artificial Neural Networks	759
<i>A. D. M. Lima, D. do C.S. Silva, V. S. Silva and M. B. De Souza Jr. Petrobras</i>	
Short and Long Timescales in Recycles	765
<i>H. A Preisig Norwegian University of Science and Technology</i>	
Finite Automata from First-Principle Models: Computation of Min and Max Transition Times	771
<i>H. A Preisig Norwegian University of Science and Technology</i>	
Neural Modeling as a Tool to Support Blast Furnace Ironmaking	777
<i>F. Tadeu, P. de Medeiros, A. Pitasse da Cunha and A. M. F. Fileti Companhia Siderúrgica Nacional University of Campinas MetalFlexi</i>	
An Inverse Artificial Neural Network Based Modelling Approach for Controlling HFCS Isomerization Process	783
<i>M. Yuceer and R. Berber Ankara University</i>	
An Algorithm for Automatic Selection and Estimation of Model Parameters	789
<i>A. R. Secchi, N. S. M. Cardozo, E. Almeida Neto and T. F. Finkler Universidade Federal do Rio Grande do Sul</i>	
Rigorous and Reduced Dynamic Models of the Fixed Bed Catalytic Reactor for Advanced Control Strategies	795
<i>E. C. Vasco de Toledo, J. M. F. da Silva, J. F. da C. A. Meyer, and R. M. Filho, State University of Campinas</i>	

Session 6.2 - Optimization and Scheduling

Modeling of NLP Problems of Chemical Processes Described By ODE's	803
<i>M. T. de Gouvêa and D. Odloak, Universidade Presbiteriana Mackenzie</i>	
Optimal Multi-period Design and Operation of Multi-product Batch Plants	809
<i>M. S. Moreno, J. M. Montagna, and O. A. Iribarren Instituto de Desarrollo y Diseño Avellaneda</i>	
Improved Tightened MILP Formulations for Single-Stage Batch Scheduling Problems	815
<i>P. A. Marchetti and J. Cerdá Instituto de Desarrollo Tecnológico para la Industria Química</i>	
Constraint Logic Programming for Non Convex NLP and MINLP Problems	821
<i>P. R. Kotecha and R. D. Gudi Indian Institute of Technology Bombay</i>	
Heuristics for Control Structure Design	827
<i>A. Heidrich and J. O. Trierweiler Universidade Federal do Rio Grande do Sul</i>	
Algorithms for Real-Time Process Integration: One Layer Approach	833
<i>M. C. A. F. Rezende, R. M. Filho and A. C. Costa University of Campinas</i>	

Steam and Power Optimization in a Petrochemical Industry	839
<i>E. G. de Fronza Magalhães, S. Tiago, and K. A. Wada,</i> <i>Copesul ,</i> <i>Universidade Federal do Rio Grande do Sul</i>	
Multiperiod Optimization Model for Synthesis, Design, and Operation of Non-Continuous Plants	845
<i>G. Corsano, J. M. Montagna, P. A. Aguirre, and O. A. Iribarren</i> <i>Instituto de Desarrollo y Diseño Avellaneda</i>	
Dynamic Penalty Formulation for Solving Highly Constrained Mixed-Integer Nonlinear Programming Problems	851
<i>C. M. Silva and E. C. Biscaia Jr.</i> <i>Universidade Federal do Rio de Janeiro</i>	
Application of Genetic Algorithms to the Optimization of an Industrial Reactor	857
<i>I. R. de Souza Victorino and R. M. Filho</i> <i>State University of Campinas</i>	

Session 6.3 -Process Monitoring

A Novel Modular Nonlinear Network for Fault Diagnosis and Supervised Pattern Classification	865
<i>B. Bhushan and J. A. Romagnoli</i> <i>University of Sydney</i>	
Block Diagram Proposal of Protection System for a PWR Nuclear Power Plant	871
<i>F. J. De Lima and C. Garcia</i> <i>Escola Politécnica of the University of São Paulo</i>	
Performance Assessment of Model Predictive Control Systems	875
<i>O. A. Z. Sotomayor and D. Odloak</i> <i>Polytechnic School of the University of São Paulo</i>	
Towards an Integrated Co-Operative Supervision System for Activated Sludge Processes Optimisation	881
<i>C. Bassompierre, C. Cadet, J. F. Béteau, and M. Arousseau</i> <i>Laboratoire d'Automatique de Grenoble</i> <i>Laboratoire de Génie des Procédés Papetiers</i>	
Quantifying Closed Loop Performance Based on On-Line Performance Indices	887
<i>M. Farenzena and J. O. Trierweiler</i> <i>Federal University of Rio Grande do Sul</i>	
Variability Matrix: A New Tool to Improve the Plant Performance	893
<i>M. Farenzena and J. O. Trierweiler</i> <i>Federal University of Rio Grande do Sul</i>	
Assessment of Economic Performance of Model Predictive Control Through Variance/Constraint Tuning	899
<i>F. Xu, B. Huang and E.C. Tamayo</i> <i>University of Alberta</i>	
Diagnosis of Faults with Varying Intensities using Possibilistic Clustering and Fault Lines	905
<i>K. P. Detroja, R. D. Gudi, and S. C. Patwardhan</i> <i>Indian Institute of Technology Bombay</i>	

Keynotes 9 and 10

Keynote 9 - The Role of Control in Design: From Fixing Problems to the Design Of Dynamics	913
<i>A. Banaszuk, P. G. Mehta and G. Hagen</i> <i>United Technologies</i>	

Keynote 10 - Distributed Decision Making in Supply Chain Networks	929
<i>B. E. Ydstie, K. R. Jillson and E. J. Dozal-Mejorada, Carnegie Mellon University</i>	

Session 7.1 -Optimization and Design Applications

Scheduled Optimization of an MMA Polymerization Process	939
<i>R. Lepore, A. Vande Wouwer, M. Remy, R. Findeisen, Z. Nagy, and F. Allgöwer, Faculté Polytechnique de Mons, University of Stuttgart</i>	
Opportunity for Real-Time Optimization In A Newsprint Mill: A Simulation Case Study	945
<i>A. Berton, M. Perrier, and P. Stuart École Polytechnique de Montréal</i>	
Product Design via PLS Modeling: Stepping Out of Historical Data into Unknown Operating Space	951
<i>N. Lu, Y. Yao, and F. Gao, Hong Kong University of Science and Technology</i>	
Adaptive Control of Bromelain Precipitation in a Fed-Batch Stirred Tank	957
<i>F. V. da Silva, R. L. A. dos Santos and A. M. F. Fileti University of Campinas</i>	

Session 7.2 -Control of Complex Systems

Distributed Model Predictive Control of a Four-Tank System	965
<i>M. Mercangöz and F. J. Doyle III University of California, Santa Barbara</i>	
Coordinated Decentralized MPC for Plant-Wide Control of a Pulp Mill Benchmark Problem	971
<i>R. Cheng, J. F. Forbes, and W. S. Yip University of Alberta</i>	
Optimizing Hybrid Dynamic Processes by Embedding Genetic Algorithms into MPC	977
<i>T. Tometzki, O. Stursberg, C. Sonntag, and S. Engell Dortmund University</i>	
Optimal Control of Multivariable Block Structured Models	983
<i>G. Harnischmacher and W. Marquardt, RWTH Aachen University</i>	
Operability of Multivariable Non-Square Systems	989
<i>F. Lima and C. Georgakis, Tufts University</i>	

Session 7.3 - Process Control

Experimental Validation of Model-Based Control Strategies for Multicomponent Azeotropic Distillation	997
<i>L. Rueda, T. F. Edgar, and R. B. Eldridge University of Texas at Austin</i>	
Run-To-Run Control Of Membrane Filtration Processes	1003
<i>J. Busch and W. Marquardt RWTH Aachen University</i>	
Model Predictive Control of a Catalytic Flow Reversal Reactor with Heat Extraction	1009
<i>A. M. Fuxman, J. F. Forbes, and R. E. Hayes University of Alberta</i>	
NMPC with State-Space Models Obtained Through Linearization on Equilibrium Manifold	1015
<i>S. Koch, R. G. Duraiski, P. B. Fernandes, and J. O. Trierweiler Universidade Federal do Rio Grande do Sul</i>	
Multi Model Approach to Multivariable Low Order Structured-	1021

Controller Design

*M. Escobar and J. O. Trierweiler
Universidade Federal do Rio Grande do Sul*

Keynotes 11 and 12

Keynote 11 - On Data Processing and Reconciliation: Trends and the Impact of Technology 1029

*J.A. Romagnoli, P.A. Rolandi, Y.Y. Joe, and K.V. Ling
Louisiana State University*

Keynote 12 - Iterative Learning Control Applied to Batch Processes 1037

*J. H. Lee and K. S. Lee
Georgia Institute of Technology*

Session 8.1 - Optimization and Control of Petrochemical Systems

Application of Plantwide Control to Large Scale Systems. Part I - Self-Optimizing Control of The HDA Process 1049

*A. Araújo, M. Govatsmark, and S. Skogestad
Norwegian University of Science and Technology*

Dynamic Real-Time Optimization of a FCC Converter Unit 1055

*E. Almeida and A. R. Secchi
Universidade Federal do Rio Grande do Sul*

Inferential Control Based on a Modified QPLS for an Industrial FCCU Fractionator 1063

*X. Tian, L. Tu and X. Deng
China University of Petroleum*

Control Solutions for Subsea Processing and Multiphase Transport 1069

*H. Sivertsen, J.-M. Godhavn, A. Faanes, and S. Skogestad
Norwegian University of Science and Technology*

Active Control Strategy for Density-Wave in Gas-Lifted Wells 1075

*L. Sinègre, N. Petit, P. Lemétayer, and T. Saint-Pierre
Ecole des Mines de Paris*

A Control Strategy for an Oil Well Operating via Gas Lift 1081

*A. Plucenio, Antonio G. Mafra, and D. J. Pagano
Federal University of Santa Catarina*

Session 8.2 - Practical Applications of Modeling and Identification

Modeling for Control of Reactive Extrusion Processes 1089

*S. C. Garge, M. D. Wetzel, and B. A. Ogunnaike
University of Delaware*

Factors Affecting On-line Estimation of Diastereomer Composition using Raman Spectroscopy 1095

*S.-W. Wong, C. Georgakis, G. Botsaris, K. Saranteas, and R. Bakale
Tufts University*

Modeling and Identification of Nonlinear Systems using SISO Lem-Hammerstein and Lem-Wiener Model Structures 1101

*P. B. Fernandes, D. Schlipf, and J. O. Trierweiler
Universidade Federal do Rio Grande do Sul*

Multivariable Fuzzy Identification Approach Applied to Complex Liquid Residues Incineration Process 1107

F. M. Almeida, G. Barreto, and G. L. O. Serra, University of Campinas

Identification of Polynomial NARMAX Models for an Oil Well Operating by Continuous Gas-Lift 1113

*D. J. Pagano, V. D. Filho, and A. Plucenio
Federal University of Santa Catarina*

Comparison Between Phenomenological and Empirical Models for Polymerization Processes Control 1119

T. F. Finkler, G. A. Neumann, N. S. M. Cardozo and A. R. Secchi,

Session 8.3 - Performance Assessment of Closed-Loop Systems

Performance Assessment of Run-To-Run EWMA Controllers	1127
<i>A. V. Prabhu and T. F. Edgar</i> <i>University of Texas at Austin</i>	
Modified Independent Component Analysis for Multivariate Statistical Process Monitoring	1133
<i>J.-M. Lee, S. J. Qin, and I.-B. Lee</i> <i>University of Texas at Austin</i>	
Detection and Diagnosis of Plant-Wide Oscillations via the Method of Spectral Envelope	1139
<i>H. Jiang, M. A. A. S. Choudhury, and S. L. Shah</i> <i>University of Alberta</i>	
Detection of Plant-Wide Disturbances Using a Spectral Classification Tree	1145
<i>N. F. Thornhill and H. Melbø</i> <i>University College London</i>	
Root Cause Analysis of Oscillating Control Loops	1151
<i>R. Srinivasan, M. R. Maurya, and R. Rengaswamy</i> <i>Clarkson University</i> <i>University of California, San Diego</i>	
Quantification of Valve Stiction	1157
<i>M. Jain, M. A. A. S. Choudhury, and S. L. Shah</i> <i>University of Alberta</i>	
Author Index	1163