

7th IFAC Symposium on Nonlinear Control Systems 2007

**Pretoria, South Africa
22-24 August 2007**

Volume 1 of 2

ISBN: 978-1-60560-751-1

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571
www.proceedings.com

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2007) by the International Federation of Automatic Control (IFAC)
All rights reserved.

Printed by Curran Associates, Inc. (2009)

For permission requests, please contact the publisher, International Federation of Automatic Control (IFAC)
at the address below.

IFAC Secretariat
Schlossplatz 12
A-2361 Laxenburg
Austria

Phone: +43 2236 71 447
Fax: +43 2236 72 859

secretariat@ifac-control.org

TABLE OF CONTENTS

VOLUME 1

PLENARY 1

THE PEBBLE BED MODULAR REACTOR AND THE USAGE OF SYSTEMS ENGINEERING TO ESTABLISH NEW STANDARDS FOR THE NUCLEAR REVIVAL	1
<i>Willie Theron Dieter Matzner Louwrence Erasmus</i>	

PLENARY 2

A UNIFYING POINT OF VIEW ON OUTPUT FEEDBACK DESIGNS.....	8
<i>V. Andrieu, L. Praly</i>	

SEMI-PLENARY 1

NONLINEAR CONTROL OF PDES: ARE FEEDBACK LINEARIZATION AND GEOMETRIC METHODS APPLICABLE?.....	20
<i>Miroslav Krstic Rafael Vazquez</i>	

SEMI-PLENARY 2

CONTROL BY (STATE-MODULATED) INTERCONNECTION OF PORT-HAMILTONIAN SYSTEMS	28
<i>Romeo Ortega Arjan van der Schaft Fernando Castanos Alessandro Astolfi</i>	

ADVANCES IN THEORETICAL FOUNDATIONS OF NMPC

TUBE-BASED ROBUST NONLINEAR MODEL PREDICTIVE CONTROL.....	36
<i>David Q. Mayne Eric C. Kerrigan</i>	

REGIONAL INPUT-TO-STATE STABILITY OF MIN-MAX MODEL PREDICTIVE CONTROL	42
<i>Davide Martino Raimondo Daniel Limon Mircea Lazar Lalo Magni Eduardo Fernandez Camacho</i>	

MODEL PREDICTIVE CONTROL OF CONTINUOUS TIME NONLINEAR DIFFERENTIAL ALGEBRAIC SYSTEMS	48
<i>Johan Sjoberg Rolf Findeisen Frank Allgower</i>	

A DECENTRALIZED MPC ALGORITHM FOR NONLINEAR SYSTEMS	54
<i>Davide Martino Raimondo Lalo Magni Riccardo Scattolini</i>	

MODEL PREDICTIVE CONTROL FOR NONLINEAR TIME-DELAY SYSTEMS.....	60
<i>Tobias Raff Carsten Angrick Rolf Findeisen Jung-Su Kim Frank Allgower</i>	

NEW COMPLEX SYSTEMS

QUANTITATIVE CONVERGENCE ANALYSIS OF MULTI-AGENT SYSTEMS	66
<i>S. Emre Tuna Rodolphe Sepulchre</i>	
ENTROPY OF CURVES FOR NONLINEAR SYSTEMS CLASSIFICATION	72
<i>Aldo Balestrino Andrea Caiti Emanuele Crisotomi</i>	
SWITCHED UNCERTAIN LINEAR SYSTEMS CONTROL BY ROBUST H_∞ SMC SYNTHESIS	78
<i>Jie Lian Georgi Marko Dimirovski Jun Zhao</i>	
DATA BASED QUANTIFICATION OF SYSTEM NONLINEARITY	84
<i>Shoukat Choudhury Sirish Shah</i>	
A MODEL FOR THE DYNAMICAL PROCESS OF CLUSTER FORMATION	90
<i>D. Aeyels, F. De Smet</i>	

NONLINEAR MATHEMATICAL SYSTEMS THEORY

REDUCED DYNAMIC INVERSION FOR PLANAR AND SPATIAL VEHICLES	95
<i>Alessandro Saccon John Hauser Ruggero Frezza</i>	
THE DRIVEN ROLLING TORUS	101
<i>John Hauser Alessandro Saccon</i>	
HOMOGENEOUS EIGENVALUE ANALYSIS FOR COMPLEX HOMOGENEOUS SYSTEMS	107
<i>Nami Nakamura Hisakazu Nakamura Yuh Yamashita Hirokazu Nishitani</i>	
A TRAJECTORY BASED APPROACH FOR ROBUST STABILITY PROPERTIES OF INFINITE-DIMENSIONAL SYSTEMS	113
<i>Ying Tan Dragan Nesic Andrew Teel</i>	
COMPUTING THE SETTLING TIME FOR NONLINEAR STEP RESPONSES	119
<i>S. Glad</i>	
ENSEMBLE CONTROL ON LIE GROUPS	123
<i>Jr-Shin Li Navin Khaneja</i>	

BOUNDARY CONTROL OF NONLINEAR PDES 1

ON UNIFORM STABILIZATION OF A SEMILINEAR WAVE EQUATION WITH VARIABLE COEFFICIENTS UNDER THE NONLINEAR BOUNDARY FEEDBACK	129
<i>Zhi-Chao Shao Bao-Zhu Guo</i>	
ON THE BOUNDARY CONTROL OF KIRCHHOFF'S NONLINEAR STRING	135
<i>Omer Morgul Shahram Shahruz</i>	
TRACKING CONTROL FOR A DIFFUSION-CONVECTION-REACTION SYSTEM: COMBINING FLATNESS AND BACKSTEPPING	140
<i>Thomas Meurer Andreas Kugi</i>	
BOUNDARY CONTROL LAWS FOR PARABOLIC PDES WITH VOLTERRA NONLINEARITIES—PART I: DESIGN	146
<i>Rafael Vazquez Miroslav Krstic</i>	

BOUNDARY CONTROL LAWS FOR PARABOLIC PDES WITH VOLTERRA NONLINEARITIES--PART III: ANALYSIS.....	152
<i>Rafael Vazquez Miroslav Krstic</i>	

NONLINEAR MODELING AND IDENTIFICATION

PORT-BASED FINITE ELEMENT MODEL OF A FLEXIBLE LINK.....	158
<i>Alessandro Macchelli Stefano Stramigioli Claudio Melchiorri</i>	
AN IDENTIFIABLE CONTROL-ORIENTED DYNAMIC FRICTION MODEL.....	164
<i>L. Alvarez-Icaza, R. Jimenez-Fabian</i>	
USING MANIFOLD LEARNING FOR NONLINEAR SYSTEM IDENTIFICATION.....	170
<i>Henrik Ohlsson Jacob Roll Lennart Ljung Torkel Glad</i>	
MODEL REDUCTION OF NONLINEAR DIFFERENTIAL-ALGEBRAIC EQUATIONS	176
<i>Johan Sjoberg Torkel Glad Kenji Fujimoto</i>	
APPROXIMATION OF FAST SPECIES IN KINETIC NETWORKS USING NON- NEGATIVE POLYNOMIALS	182
<i>Klaas Martijn Nauta Siep Weiland Ton Backx</i>	
IDENTIFICATION OF THE INERTIA MATRIX OF A ROTATING BODY BASED ON ERRORS-IN-VARIABLES MODELS.....	188
<i>Byung-Eul Jun Dennis Bernstein Harris McClamroch</i>	
CONTROLLABILITY OF SWITCHED SYSTEMS	194
<i>Daizhan Cheng</i>	
NONLINEAR OUTPUT REGULATION AND CROSS-TERMS COMPENSATION.....	202
<i>Lorenzo Marconi</i>	

ADVANCES IN COMPUTATIONAL TECHNIQUES OF NMPC

A PRACTICAL APPROACH TO PREDICTIVE CONTROL FOR NONLINEAR PROCESSES	210
<i>Agustinho Plucenio Daniel Pagano Augusto Bruciapaglia Julio E. Normey-Rico</i>	
A STABILISING NONLINEAR PREDICTIVE CONTROL STRATEGY	216
<i>S. Cristea, C. Prada</i>	
INPUT TO STATE STABILISING NON LINEAR MODEL PREDICTIVE CONTROL BASED ON QP.....	222
<i>J. Mare, M. Lazar, J. De Dona</i>	
ADAPTIVE ROBUST MPC: AN EYE TOWARDS COMPUTATIONAL SIMPLICITY.....	228
<i>Darryl Dehaan Veronica Adetola Martin Guay</i>	
AN ONLINE ACTIVE SET STRATEGY FOR FAST ADJOINT BASED NONLINEAR MODEL PREDICTIVE CONTROL.....	234
<i>Leonard Wirsching Hans Joachim Ferreau Hans Georg Bock Moritz Diehl</i>	

NONLINEAR SYSTEM COMPLEXITY AND NETWORKING

GRAZING ANALYSIS FOR SYNCHRONIZATION OF CHAOTIC HYBRID SYSTEM.....	240
<i>Djamila Benmerzouk Jean-Pierre Barbot</i>	

PERFORMANCE CONTROL OF AGGREGATE QOS NETWORKING PROCESSES.....246
Alexandru Murgu

**A NON-EQUILIBRIUM ANALYSIS & CONTROL FRAMEWORK FOR
COMMUNICATION NETWORKS.....252**
T. Alpcan, P. Wang, P. Mehta, T. Basar

**A LYAPUNOV ISS SMALL-GAIN THEOREM FOR STRONGLY CONNECTED
NETWORKS258**
Sergey N. Dashkovskiy Bjorn S. Ruffer Fabian R. Wirth

**ROBUST STRUCTURAL SYNCHRONIZATION IN DYNAMICAL COMPLEX
NETWORKS264**
S. Celikovsky, V. Lynnyk, G. Chen

MATHEMATICAL ANALYSIS OF NONLINEAR SYSTEMS

**IMPROVING CONVERGENCE OF PERTURBATION-BASED EXTREMUM
SEEKING METHODS FOR A CLASS OF DIFFERENTIALLY FLAT SYSTEMS270**
M. Chioua, B. Srinivasan, M. Perrier, M. Guay

GROWTH RATE OF SWITCHED HOMOGENEOUS SYSTEM.....276
S. Emre Tuna

ABOUT THE OBSERVABILITY OF NONLINEAR SWITCHING SYSTEMS282
Rudy Kajdan Didier Aubry Frederic Kratz

A BASIC CONVERGENCE RESULT FOR PARTICLE FILTERING288
Xiao-Li Hu Thomas B. Schon Lennart Ljung

**CLASSIFICATION AND CONTROL FOR DRIFTLESS SYSTEM IN VIEW OF
PARAMETER ERROR IN COORDINATE TRANSFORMATION294**
Tadasuke Matsumoto Shigeki Nakaura Mitsuji Sampei

**CONSERVATION LAWS FOR INVARIANT FUNCTIONALS CONTAINING
COMPOSITIONS300**
G. Frederico, D. Torres

BOUNDARY CONTROL OF NONLINEAR PDES 11

**MOTION PLANNING FOR THE HEAT EQUATION WITH RADIATION BOUNDARY
CONDITIONS BASED ON FINITE DIFFERENCE SEMI-DISCRETIZATIONS.....306**
Tilman Utz Thomas Meurer Andreas Kugi

**BOUNDARY CONTROL OF SYSTEMS OF CONSERVATION LAWS: LYAPUNOV
STABILITY WITH INTEGRAL312**
Valerie Dos Santos Georges Bastin Jean-Michel Coron Brigitte d'Andrea-Novel

MODEL BASED PIPELINE MONITORING WITH LEAK DETECTION.....318
E. Hauge, O. Aamo, J.M. Godhavn

**BACKSTEPPING BOUNDARY CONTROL OF MAGNETOHYDRODYNAMIC
CHANNEL FLOW.....324**
Rafael Vazquez Eugenio Schuster Miroslav Krstic

**BOUNDARY CONTROL LAWS FOR PARABOLIC PDES WITH VOLTERRA
NONLINEARITIES—PART II: EXAMPLES330**
Rafael Vazquez Miroslav Krstic

MODEL BASED FEEDBACK DESIGN AND APPLICATIONS

REDUCTION OF AMPLITUDE DEPENDENT GAIN VARIATIONS IN CONTROL OF NON-LINEAR WIENER TYPE SYSTEMS	336
<i>T. Wigren, L. Brus</i>	
OUTPUT FEEDBACK REGULATION OF A FLEXIBLE JOINT MANIPULATOR	342
<i>Miguel Rios-Bolivar Alirio Navas</i>	
A STATE FEEDBACK CONTROL METHODOLOGY FOR NONLINEAR SYSTEMS WITH TIME/STATE DEPENDENT INPUT DELAY	348
<i>Gildas Besancon Didier Georges Zohra Benayache</i>	
COMPUTING FEASIBLE TRAJECTORIES FOR CONTROL-CONSTRAINED SYSTEMS: THE PVTOL EXAMPLE	354
<i>Giuseppe Notarstefano John Hauser Ruggero Frezza</i>	
ADAPTIVE CONTROL REDESIGN FOR NONLINEAR SAMPLED-DATA SYSTEMS	360
<i>Laurent Burlion Tarek Ahmed-Ali Romain Postoyan Francoise Lamnabhi-Lagarrigue</i>	
MODEL REDUCTION OF NONLINEAR SYSTEMS: A GREY-BOX MODELING APPROACH	366
<i>Leyla Ozkan Reinout Romijn Siep Weiland Wolfgang Marquardt Jobert Ludlage</i>	
PROBING BIOLOGICAL CELL NETWORKS USING MATHEMATICAL MODELS	372
<i>Robin Raffard Keith Amonlirdvima Jeffrey Axelrod Claire Tomlin</i>	
ANALYSIS OF THE HIV DYNAMICS	379
<i>C. Moog, D. Ouattara, M.J. Mhawej</i>	
ANALYSIS AND SYNTHESIS OF DISTURBANCE OBSERVER AS A TOOL FOR NONLINEAR ROBUST CONTROL	387
<i>Juhoon Back Hyungbo Shim</i>	

NOVEL APPLICATIONS OF NMPC

ASSESSMENT OF NONLINEAR PREDICTIVE CONTROL TECHNIQUES FOR DC-DC CONVERTERS	395
<i>A.G. Beccuti M. Lazar W.P.M.H Heemels G. Papafotiou M. Morari</i>	
PREDICTIVE CONTROL WITH ROBUST DEAD-TIME COMPENSATION: APPLICATION TO DRUG DOSING DURING ANESTHESIA	402
<i>Bismark Torrico Robin De Keyser Clara Ionescu Julio E. Normey-Rico</i>	
MIXED INTEGER PREDICTIVE CONTROL OF A BUCK BOOST CONVERTER	408
<i>Daniel Sarabia Martin J. Pomar Julio E. Normey-Rico Cesar de Prada</i>	
APPLICATION OF A SMITH PREDICTOR BASED NONLINEAR PREDICTIVE CONTROLLER TO A SOLAR POWER PLANT	414
<i>Manuel Galvez-Carrillo Robin De Keyser Clara Ionescu</i>	
FAST NMPC OF A DC-DC CONVERTER: AN EXACT NEWTON REAL-TIME ITERATION APPROACH	420
<i>Julian Bonilla Robin De Keyser Moritz Diehl Jairo Espinosa</i>	

OBSERVATION OF NONLINEAR SYSTEMS

DISCUSSIONS ON OBSERVABILITY AND INVERTIBILITY	426
<i>Wei Kang Jean-Pierre Barbot</i>	
SINGLE OUTPUT DEPENDENT QUADRATIC OBSERVABILITY NORMAL FORM	432
<i>Zheng Gang Boutat Driss Barbot Jean-Pierre</i>	
OBSERVER DESIGN VIA ABSOLUTE STABILITY FOR A CLASS OF NONLINEAR DESCRIPTOR SYSTEMS	438
<i>Tobias Raff Frank Allgower</i>	
STATE ESTIMATION FOR TWO OUTPUT SYSTEMS IN DISCRETE TIME	444
<i>C. Califano, S. Monaco, D. Normand-Cyrot</i>	
A GENERALIZED NORMAL FORM AND NONLINEAR OUTPUTS FOR A CASCADE OBSERVER	450
<i>Driss Boutat Salim Chaib Frederic Kratz Hassan Hammouri</i>	
HOMOGENEOUS OBSERVERS WITH DYNAMIC HIGH GAINS	456
<i>Vincent Andrieu Laurent Praly Alessandro Astolfi</i>	

NEW APPROACHES TO STABILITY AND STABILIZATION

CONSTRUCTIVE SAFETY USING CONTROL BARRIER FUNCTIONS	462
<i>P. Wieland, F. Allgower</i>	
TRANSITIONS BETWEEN LIMIT CYCLES FOR AN UNDERACTUATED SYSTEM: VIRTUAL HOLONOMIC CONSTRAINTS APPROACH	468
<i>Leonid Freidovich Anton Shiriaev Ian Manchester</i>	
PORT-CONTACT SYSTEMS IN BILATERAL TELEMANIPULATION	474
<i>C. Secchi, S. Stramigioli, C. Fantuzzi</i>	
PORT-BASED ENERGY BALANCE ON COMPACT MANIFOLDS	480
<i>Gou Nishida Ryuji Enomoto Masaki Yamakita Zhiwei Luo</i>	
RELAXED CHARACTERIZATIONS OF SMOOTH PATCHY CONTROL LYAPUNOV FUNCTIONS	486
<i>Rafal Goebel Christophe Prieur Andrew R. Teel</i>	
UNITING LOCAL AND GLOBAL OUTPUT FEEDBACK CONTROLLERS	492
<i>Christophe Prieur Andrew R. Teel</i>	

TRACKING OF NONLINEAR SYSTEMS

OUTPUT REGULATION: GEOMETRIC VIEWPOINTS	498
<i>Francesco Delli Priscoli Alberto Isidori Marconi Lorenzo</i>	
TOWARDS A MODEL-FREE OUTPUT TRACKING OF SWITCHED NONLINEAR SYSTEMS	504
<i>Romain Bourdais Michel Fliess Cedric Join Wilfrid Perruquetti</i>	
GENERALIZED NONLINEAR MANEUVER REGULATION	510
<i>Jiangfeng Zhang</i>	
TRACKING OF NONHOLONOMIC CHAINED-FORM SYSTEMS WITHOUT PERSISTENT EXCITATION	515
<i>Yu-Ping Tian Ke-Cai Cao</i>	

STRAIGHT LINE PATH FOLLOWING FOR FORMATIONS OF UNDER ACTUATED SURFACE VESSELS	521
<i>A. Pavlov, E. Borhaug, E. Panteley, K. Pettersen</i>	

A NEW PERSPECTIVE ON STABLE INVERSION OF NON-MINIMUM PHASE NON LINEAR SYSTEMS.....	527
<i>A. Pavlov, K. Pettersen</i>	

BIOLOGICAL AND BIOMEDICAL SYSTEMS

LINEAR AND NONLINEAR METHODS FOR GENE REGULATORY NETWORK INFERENCE	533
<i>Nicola Soranzo Ginestra Bianconi Claudio Altafini</i>	

BIFURCATION ANALYSIS OF THE CONTROL MECHANISM OF PACEMAKER ACTIVITY IN A MATHEMATICAL CARDIAC CELL MODEL.....	539
<i>Karima Djabella Mayer Landau Michel Sorine</i>	

A DIRECT-REVERSE TIME INTERVAL OBSERVER. APPLICATION TO BIOTECHNOLOGICAL MODELS	545
<i>Marcelo Moisan Olivier Bernard</i>	

MODELLING OF THE CO-INFECTION DYNAMICS OF HIV-1 AND MYCOBACTERIUM TUBERCULOSIS	551
<i>E. Toit</i>	

ANAYSIS AND CONTROL DESIGN FOR HUMAN POSTURAL BALANCING SYSTEMS.....	557
<i>C.L. Li, Y.C. Lin, C.L. Lin</i>	

ON STABILITY OF A COMBINED GLEEVEC AND IMMUNE MODEL CHRONIC IN LEUKEMIA: EXPLOITING DELAY SYSTEM STRUCTURE	563
<i>Silviu-Iulian Niculescu Peter Kim Peter Lee Doron Levy</i>	

NETWORKED CONTROL SYSTEMS: AN EMULATION APPROACH TO CONTROLLER DESIGN	569
<i>Dragan Nesic</i>	

MODEL REDUCTION BY MOMENT MATCHING	577
<i>Alessandro Astolfi</i>	

MODEL PREDICTIVE CONTROL WITH APPLICATIONS

ON RELAXATIONS APPLICABLE TO MODEL PREDICTIVE CONTROL FOR SYSTEMS WITH BINARY CONTROL SIGNALS.....	585
<i>Daniel Axehill Lieven Vandenberghe Anders Hansson</i>	

NONLINEAR MODEL PREDICTIVE CONTROL OF A FAST PARALLEL ROBOT ACTUATED BY PNEUMATIC MUSCLES	591
<i>Dominik Schindele Harald Aschemann</i>	

GEOMETRIC CONSTRUCTION OF PERIODIC TRAJECTORIES.....	597
<i>Kai Hoeffner Nicolas Hudon Martin Guay</i>	

NETWORKED DECENTRALIZED MPC FOR UNICYCLE VEHICLES FORMATION	603
<i>Massimo Vaccarini Sauro Longhi</i>	

VOLUME 2

AN INTELLIGENT GENERALIZED PREDICTIVE CONTROLLER FOR SHIP STEERING	609
<i>YaoHua Hu SuWu Xu Zongnian Zhang</i>	

STABILIZING OUTPUT FEEDBACK RECEDING HORIZON CONTROL OF SAMPLED-DATA NONLINEAR SYSTEMS VIA THEIR APPROXIMATE DISCRETE-TIME MODELS	615
<i>Ahmed Elaiw</i>	

ROBUST ESTIMATION OF NONLINEAR SYSTEMS

ROBUST H_∞ FILTERING FOR A CLASS OF NON LINEAR DISCRETE-TIME SYSTEMS	621
<i>D.F. Coutinho, C.E. Souza, K.A. Barbosa</i>	

A STOCHASTIC ROBUSTNESS APPROACH TO DESIGNING UNKNOWN INPUT OBSERVERS FOR NON-LINEAR SYSTEMS	627
<i>Marcin Witczak Przemyslaw Pretki Jozef Korbicz</i>	

ON THE HAMILTONIAN TECHNIQUES FOR DESIGNING NONLINEAR OBSERVERS UNDER SET-MEMBERSHIP UNCERTAINTY	633
<i>Mikhail Gusev Alexander Kurzhanski</i>	

ANALYSIS OF HOPF BIFURCATION FOR AN INTERNET CONGESTION CONTROL SYSTEM	639
<i>M. Motlagh, B. Rezaie, S. Khorsandi, M. Analoui</i>	

ROBUST TRAJECTORY TRACKING FOR A CLASS OF UNCERTAIN NONLINEAR SYSTEMS	645
<i>Engelbert Gruenbacher Luigi del Re</i>	

NONLINEAR UNKNOWN INPUT OBSERVER IN A STOCHASTIC FRAMEWORK	651
<i>T. Cheviron, F. Plestan, H. Chriette</i>	

STABILITY AND STABILIZATION OF SYSTEMS WITH NONLINEARITIES IN THE INPUT

STABILIZATION OF A CLASS OF NONLINEAR SYSTEMS WITH SATURATING ACTUATORS VIA SLIDING MODE CONTROL	657
<i>M.L. Corradini, G. Orlando, V. Orsini, G. Parlangeil</i>	

ROBUST ADAPTIVE CONTROL OF NONLINEAR SYSTEMS WITH UNKNOWN INPUT HYSTERESIS WITH KP PRESENTATION	663
<i>Yu-Feng Wang Chun-Yi Su Henry Hong</i>	

STABILITY ANALYSIS FOR SYSTEMS WITH BACKLASH AND SATURATED ACTUATOR	669
<i>Sophie Tarbouriech Christophe Prieur</i>	

A PRACTICAL METHOD FOR FIXED-ORDER ANTI-WINDUP DESIGN	675
<i>Jean-Marc Biannic Clement Roos Sophie Tarbouriech</i>	

STABILITY CRITERIA FOR RATE LIMITED LUR'E SYSTEMS WITH CONNECTIONS TO MAGNITUDE LIMITS AND ANTI-WINDUP	681
<i>Murray Kerr Matthew Turner Ian Postlethwaite</i>	

NONLINEAR L2 ANTI-WINDUP FOR ENLARGED STABILITY REGIONS AND REGIONAL PERFORMANCE.....	687
<i>Sergio Galeani Simona Onori Andrew R. Teel Luca Zaccarian</i>	

ALGEBRAIC APPROACH TO NONLINEAR SYSTEMS

CONSTRUCTION OF FLAT OUTPUTS BY REDUCTION AND ELIMINATION.....	693
<i>Kurt Schlacher Markus Schoberl</i>	
GENERALIZED STATE EQUATIONS FOR CONTINUOUS-TIME BILINEAR INPUT-OUTPUT EQUATIONS: REMOVING THE INPUT DERIVATIVES.....	699
<i>Tanel Mullari Ulle Kotta Palle Kotta Alan Zinober</i>	
IRREDUCIBILITY CONDITIONS FOR NONLINEAR INPUT-OUTPUT EQUATIONS ON HOMOGENEOUS TIME SCALES.....	705
<i>Zbigniew Bartosiewicz Ulle Kotta Ewa Pawluszewicz Malgorzata Wyrwas</i>	
PSEUDO-LINEAR ALGEBRA: A POWERFUL TOOL IN UNIFICATION OF THE STUDY OF NONLINEAR CONTROL SYSTEMS.....	711
<i>Miroslav Halas Ulle Kotta</i>	
THE POLE-ZERO STRUCTURE OF NONLINEAR CONTROL SYSTEMS.....	717
<i>Anna Maria Perdon Claude Moog Giuseppe Conte</i>	

NONLINEAR ESTIMATION AND CONTROL OF BIOCHEMICAL SYSTEMS

PETRI NET TOOLS FOR THE ANALYSIS OF PERSISTENCE IN CHEMICAL NETWORKS.....	721
<i>David Angeli Patrick De Leenheer Eduardo Sontag</i>	
DISCRETE-TIME INTERVAL OBSERVERS APPLIED TO CULTURES OF PHYTOPLANKTON.....	727
<i>G. Goffaux, A. Wouwer, O. Bernard</i>	
ON AUTOMATIC SEEKING OF OPTIMAL STEADY-STATES IN BIOCHEMICAL PROCESSES.....	733
<i>Georges Bastin Dragan Nesic Ying Tan Iven Mareels</i>	
A FORMAL FRAMEWORK FOR MULTIPLICITY DETECTION AND ITS IMPLICATIONS IN ROBUST CONTROL OF BIOCHEMICAL NETWORKS.....	739
<i>Irene Otero-Muras Antonio A. Alonso Julio R. Banga</i>	
ON THE USE OF NONLINEAR RECEDING-HORIZON OBSERVERS IN BATCH TERPOLYMERIZATION PROCESSES WITH PARTIALLY UNMODELLED DYNAMICS: FORMULATION AND EXPERIMENTAL VALIDATION.....	745
<i>Mazen Alamir Nida Sheibat-Othman Sami Othman</i>	
CONVERGENCE OF MULTI-UNIT OPTIMIZATION WITH NON-IDENTICAL UNITS: APPLICATION TO THE OPTIMIZATION OF A BIOREACTOR.....	751
<i>L. Woodward, M. Perrier, B. Srinivasan</i>	
BIFURCATION CONTROL: NEW DIRECTIONS MOTIVATED BY BIOLOGY AND COMPLEX ENGINEERED SYSTEMS.....	757
<i>Eyad H. Abed</i>	

POSTERS 1

AN ADAPTIVE ROBUST STATE OBSERVER SCHEME FOR A CLASS OF UNCERTAIN NONLINEAR DYNAMICAL SYSTEMS.....	764
<i>Hansheng Wu</i>	
ADAPTIVE STATE FEEDBACK CONTROL OF NONLINEARLY PARAMETERIZED TIME-DELAY SYSTEMS	770
<i>Xiaohong Jiao Tielong Shen Yuanzhang Sun</i>	
ESTIMATION OF PARSIMONIOUS DISCRETE VOLTERRA SERIES	776
<i>Robert Harrison Tony Dodd</i>	
CRITERIA AND TIME HORIZON IN FEEDFORWARD MPC FOR NON-LINEAR SYSTEMS WITH TIME DELAYS	782
<i>Torbjorn Wigren Linda Brus</i>	
DATA-BASED VALIDATION OF NONLINEAR MODELS	788
<i>Matias Waller Mikael Ronn Henrik Saxen</i>	
SYNTHESIS OF COMPLETE ORTHO NORMAL FRACTIONAL BASIS FUNCTIONS WITH PRESCRIBED POLES.....	794
<i>H. Akcay</i>	
NONLINEAR CONTROL SYSTEM INVERSION USING LIE SYMMETRIES.....	800
<i>Richard Ocaya Brian Wigdorowitz</i>	
NONLINEAR CONTROL OF A SEQUENTIAL INSPECTION OPERATION	804
<i>Meir Pachter Phillip Chandler Darbha Swaroop</i>	
A FOLIATION FOR UNKNOWN INPUTS RECONSTRUCTION.....	810
<i>Salim Chaib Driss Boutat Abderraouf Benali Frederic Kratz</i>	
STRONG FEASIBILITY IN INPUT-MOVE-BLOCKING MODEL PREDICTIVE CONTROL	816
<i>Ravi Gondhalekar Jun-ichi Imura</i>	
INTERPOLATION PROBLEMS ON RIEMANNIAN MANIFOLDS - A GEOMETRIC APPROACH -.....	822
<i>Rui Rodrigues Fatima Silva Leite</i>	
EXPLICIT FORM OF LYAPUNOV FUNCTIONS FOR A CLASS OF NONLINEAR FEEDBACK SYSTEMS AUGMENTED WITH OBSERVERS	828
<i>A. Shiriaev, R. Johansson, A. Robertsson</i>	
H-∞ SMOOTHER FOR LIPSCHITZ NONLINEAR SYSTEMS	834
<i>Philippe Neveux Eric Blanco</i>	
STABILIZATION OF LINEAR SWITCHED CONTROLLED SYSTEMS	840
<i>Zoltan Szabo Jozsef Bokor Gary Balas</i>	
GEOMETRICAL CONDITIONS FOR OBSERVER ERROR LINEARIZATION VIA $0 \rightarrow 1, \dots \rightarrow (N-2) - f$.....	846
<i>Driss Boutat</i>	
ON OPTIMIZING NONLINEAR ADAPTIVE CONTROL ALLOCATION WITH ACTUATOR DYNAMICS	852
<i>Johannes Tjonas Tor Arne Johansen</i>	
ON STABILITY AND CONTROL OF SYSTEMS WITH TIME-VARYING SAMPLING PERIOD AND TIME DELAY	858
<i>Michal Izak Daniel Gorges Steven Liu</i>	

GEOMETRIC ANALYSIS OF TIME VARIANT HAMILTONIAN CONTROL SYSTEMS	864
<i>M. Schoberl, R. Stadlmayr, K. Schlacher</i>	
ROBUST FLATNESS BASED CONTROLLER DESIGN USING INTERVAL METHODS	870
<i>Marco Kletting Felix Anritter Eberhard P. Hofer</i>	
MULTIVARIABLE RBF-ARX MODEL-BASED PREDICTIVE CONTROL FOR NONLINEAR SYSTEMS	876
<i>H. Peng</i>	
CONSTRAINED CONTROLLABILITY OF SEMILINEAR SYSTEMS WITH MULTIPLE DELAYS IN CONTROL	882
<i>J. Klamka</i>	
CONTROLLABILITY OF ISOSPECTRAL BILINEAR CONTROL SYSTEMS ON COMPLEX FLAG MANIFOLDS	888
<i>Claudio Altafini</i>	
MODEL-FREE HIGH ORDER DIFFERENTIAL STATES OBSERVER FOR NONLINEAR AFFINE SYSTEM	892
<i>G. Qi, M. Wyk, B. Wyk</i>	
CONSTRUCTIVE TRANSFORMATION OF NONLINEAR SYSTEMS INTO A SPECIAL STATE AFFINE MIMO FORM AND NONLINEAR OBSERVERS	898
<i>I. Souleiman, A. Glumineau</i>	

POSTERS 2

LOGIC BASED DESIGN OF OPTIMAL RECONFIGURATION STRATEGIES FOR SHIP POWER SYSTEMS	904
<i>Harry Kwatny Ed Mensah Dagmar Niebur Gaurav Bajpai Carole Teolis</i>	
APPLICATION OF RESET CONTROL TO A BATCH REACTOR IN THE PRECIOUS GROUP METALS INDUSTRY	910
<i>R. Lahee</i>	
AN EXTENDED UNKNOWN INPUT OBSERVER-BASED APPROACH TO FAULT DIAGNOSIS OF A TWO-TANK SYSTEM	916
<i>Jozef Korbicz Marcin Witczak</i>	
PID+ BACKSTEPPING CONTROL OF RELATIVE SPACECRAFT ATTITUDE	922
<i>Thomas R. Krogstad Raymond Kristiansen Jan Tommy Gravdahl Per Johann Nicklasson</i>	
EXTRACTION OF MOTION FOR 4-WHEEL DRIVE, 4-WHEEL STEER MOBILE ROBOT WITH REDUCED ORDER HAMILTONIAN MODEL	928
<i>Kursat Yalcin Murat Yesiloglu Hakan Temeltas</i>	
FEEDBACK LINEARIZATION BASED CONTROL OF A ROTATIONAL HYDRAULIC DRIVE	934
<i>Jaho Seo Ravinder Venugopal Jean-Pierre Kenne</i>	
NEURAL NETWORK-BASED DYNAMIC INVERSION CONTROLLER FOR FIGHTER AIRCRAFTS	940
<i>Jimoh Pedro Nicolas Meyer</i>	
GPS-DENIED SOURCE SEEKING FOR A NONHOLONOMIC UNICYCLE VIA HEADING CONTROL	946
<i>Jennie Cochran Antranik Siranosian Nima Ghods Daniel Arnold Miroslav Krstic</i>	

HYBRID OPTIMAL CONTROL OF AN AUTOMATED MANUAL TRANSMISSION SYSTEM	952
<i>G. Lucente, M. Montanari, C. Rossi</i>	
NEURO-FUZZY CONTROL OF A SINGLE POINT LATHE CUTTING TOOL	958
<i>R. Marumo, O.S. Motsamai, T. Bodika</i>	
OPTIMAL CLOSED-LOOP CONTROLLER DESIGN FOR AN ION EXCHANGE PROCESS USED FOR DESALINATION OF WATER	964
<i>N.M. Dube, R. Tzoneva</i>	
PASSIVITY-BASED CONTROLLER FOR N-PHASE APF	970
<i>S. Mei, L. Chen, W. Hu, J. Chen</i>	
A NEURAL NETWORK MODEL FOR CONTROL OF WASTEWATER TREATMENT PROCESSES	975
<i>C. Kriger, R. Tzoneva</i>	
IDENTIFIABILITY OF THE PARAMETERS OF A NONLINEAR MODEL OF THE CEREBROSPINAL FLUID SYSTEM	981
<i>Ian Manchester Kennet Andersson Anders Eklund Anton Shiriaev</i>	
A FLAT MODEL PREDICTIVE CONTROLLER FOR TRAJECTORY TRACKING IN IMAGE BASED VISUAL SERVOING	987
<i>Allibert Guillaume Courtial Estelle Toure Youssoufi</i>	
SENSORLESS SLIDING MODE CONTROL FOR ELECTROMAGNET	993
<i>Pavel Shavrin Alexander Gostkov Sergey Kochetkov</i>	
MODEL AND ROBUST CONTROL OF AN ELECTROPNEUMATIC ACTUATOR ON A EXPERIMENTAL SETUP	998
<i>A. Girin, F. Plestan, X. Brun, A. Glumineau, M. Smaoui</i>	
OBSERVER-BASED BRAKE CONTROL FOR RAILWAYS	1004
<i>P. Gaspar, Z. Szabo, J. Bokor</i>	
FAULT-TOLERANT CONTROL OF HEAVY HAUL TRAINS	1010
<i>Xiangtao Zhuan</i>	
 <u>NONLINEAR CONTROL IN INDUSTRIAL APPLICATIONS</u>	
CONTROL LAWS FOR AUTOMATIC TAKE-OFF USING ROBUST NONLINEAR INVERSION TECHNIQUES	1016
<i>F. Villaume, M. Jeanneau</i>	
ROBUST MPC OF A RUN-OF-MINE ORE MILLING CIRCUIT	1022
<i>LC Coetzee IK Craig</i>	
SIMULATED NEUROCONTROL OF AN AUTOGENOUS MILL WITH EVOLUTIONARY REINFORCEMENT LEARNING	1028
<i>J W De Villiers Groenewald Chris Aldrich Jacques J Eksteen Alex v E Conradie Leon P Coetzer</i>	
MOVING HORIZON ESTIMATION FOR AN INDUSTRIAL GAS PHASE POLYMERIZATION REACTOR	1034
<i>Jasmeer Ramlal Kenneth Allsford John Hedengren</i>	
ADAPTIVE STATE ESTIMATION IN A BUILDING WITH AN ADJUSTABLE DAMPER	1040
<i>R. Jimenez-Fabian, L. Alvarez-Icaza</i>	

A VARIABLE STRUCTURE ADAPTIVE POLE PLACEMENT CONTROL APPLIED TO THE SPEED CONTROL OF A THREE-PHASE INDUCTION MOTOR	1046
<i>F. Silva JR, A. Araujo</i>	

ROBUST OBSERVERS OF NONLINEAR SYSTEMS

TYRE/ROAD FRICTION ESTIMATION USING A SLIDING MODE BASED OBSERVER.....	1052
<i>Nitin Patel Christopher Edwards Sarah Spurgeon</i>	

SENSOR FDI FOR A CLASS OF NONLINEAR SYSTEMS BASED ON A SLIDING MODE OBSERVER	1058
<i>Xing-Gang Yan Christopher Edwards</i>	

DESIGN OF A CONFIDENCE INTERVAL OBSERVER - APPLICATION TO VEHICLE POSITIONING	1064
<i>G. Goffaux, A. Wouwer, M. Remy</i>	

DESIGN AND ANALYSIS OF A NONLINEAR OBSERVER FOR A HYDRAULIC SERVO SYSTEM.....	1070
<i>Maria Werlefors Alexander Medvedev</i>	

SLIDING MODE CONTROLLER DESIGN FOR SENSORLESS INDUCTION MOTOR: EXPERIMENTAL TESTS ON LOW FREQUENCIES BENCHMARK.....	1076
<i>D. Traore, J. De Leon, A. Glumineau, L. Loron</i>	

AN ALGEBRAIC PARAMETER ESTIMATION APPROACH FOR THE ADAPTIVE OBSERVER-CONTROLLER BASED REGULATION OF THE BOOST CONVERTER.....	1082
<i>Hebertt Sira-Ramirez Mario Spinetti-Rivera Enric Fossas-Collet</i>	

NONLINEAR SYSTEM STABILIZATION

A NOTE ON ROBUST NONLINEAR CONTROL OF FEEDFORWARD SYSTEMS WITH UNMODELED DYNAMICS	1088
<i>Tianshi Chen Jie Huang</i>	

SOME RESULTS ON ROBUST OUTPUT FEEDBACK STABILIZATION OF NONLINEAR SYSTEMS.....	1094
<i>Lorenzo Marconi Laurent Praly</i>	

MATRIX SET MEASURE FOR STABILITY OF SWITCHED LINEAR SYSTEMS	1100
<i>Zhendong Sun</i>	

STABILIZATION OF HOMOGENEOUS SYSTEMS USING IMPLICIT CONTROL LYAPUNOV FUNCTIONS.....	1104
<i>H. Nakamura, N. Nakamura, H. Nishitana</i>	

ON FEEDBACK STABILIZATION OF NONAFFINE DISCRETE TIME NONLINEAR SYSTEMS WITH TIME DELAYS	1110
<i>Woihida Aggoune</i>	

NONLINEAR CONTROL IN POWER AND ELECTRICAL DRIVES

THE GAP BETWEEN NONLINEAR CONTROL THEORIES AND APPLICATIONS IN POWER SYSTEMS	1115
<i>Yuanzhang Sun Fang Yang</i>	

ESTIMATION OF THE REGION OF ATTRACTION FOR A BOOST DC-AC CONVERTER CONTROL LAW	1121
<i>C. Albea, F. Gordillo</i>	

TRACKING CONTROL OF THE ANGULAR VELOCITY OF A DC-MOTOR VIA A BOOST-CONVERTER	1127
<i>Felix Anritter Johannes Tautz</i>	

ON THE GENERALIZED PROPORTIONAL INTEGRAL MULTILEVEL SIGMA DELTA SLIDING MODE CONTROL OF A BUCK CONVERTER	1133
<i>Hebertt Sira-Ramirez</i>	

VOLTAGE REGULATION IN NETWORKED ELECTRICAL POWER SYSTEMS FOR DISTRIBUTED GENERATION: A CONSTRAINED SUPERVISORY APPROACH	1139
<i>Alessandro Casavola Giuseppe Franze' Natalino Carelli</i>	

LAB APPLICATIONS OF NONLINEAR SYSTEMS

A NOTE ON THE CONTROL OF A SPHERICAL INVERTED PENDULUM	1145
<i>Guangyu Liu Mareels Iven Nesic Dragan</i>	

OUTPUT FEEDBACK DESIGN OF A TWIN PENDULUM SYSTEM IN PRESENCE OF SENSOR BIAS	1151
<i>Andre Murilo A. Pinto Mazen Alamir</i>	

A VELOCITY ESTIMATOR RELYING ON FRICTION OBSERVERS: APPLICATION TO INVERTED PENDULUM STABILIZATION	1157
<i>R. Lenain, A. Robertsson, R. Johansson, A. Shiriaev, M. Berducat</i>	

LINEARIZATION BASED H-∞ ROBUST STABILIZING PID CONTROL FOR ACTIVE MAGNETIC BEARINGS	1163
<i>Fuat Gurleyen Cagri Bahadir</i>	

DISCRETE-TIME MODEL REFERENCE CONTROLLER DESIGN FOR A COMBUSTION ENGINE TEST BENCH	1169
<i>D. Laila, E. Grunbacher, L. Del Re</i>	

TAKING ADVANTAGE OF HOMOGENEITY: A UNIFIED FRAMEWORK FOR OUTPUT FEEDBACK CONTROL OF NONLINEAR SYSTEMS	1175
<i>W. Lin, H. Lei</i>	

AUTHOR INDEX