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Venue
The University of Strathclyde
Glasgow, Scotland, UK
The 3rd IEEE CCA
TECHNICAL
PROGRAMME

Coding
WM=Wednesday morning
WA=Wednesday afternoon
WE=Wednesday evening
TM=Thursday morning
TA=Thursday afternoon
TE=Thursday evening
FM=Friday morning
FA=Friday afternoon

WEDNESDAY MORNING
24th August, 1994

8:30 - 9:30
PLENARY SESSION
Room: K3.25 - TIREE

"Managing Technological Change in
Industrial Automation: An ABB
Overview of Research Priorities"
Dr. Larry M. Sweet
ABB Stanford (USA)

Session WM-1
Room: SGBS:Level 3 - MULL
Process Control I

Chairperson: J.G. Balchen, Norwegian Institute of
Technology, Trondheim, Norway
Co-Chairperson: M. Polke, RWTH Aachen, Germany

10:00-10:20
Process Control Strategies and Process Design...........................9
H. Buchner, J. Lauber, M. Polke, RWTH Aachen, Germany
R. W. Peters, Bayer AG, Leverkusen, Germany

10:20-10:40
An Online and Offline Programmable Multi-Loop
Controller for Distributed Systems........................................15
H.J. Beestemöller, G. Thiele, I. Balcke, T. Trittin, D. Popovic,
University of Bremen, Germany

10:40-11:00
Two-channel Temperature Controller for Buildings.............21
Z. Swider, L. Trybus, M. Sniezek, Technical University of
Rzeszów, Poland

11:00-11:20
Robust Multivariable Control of Plasma Etching of Si and
SiO₂ in SF₆/Argon.........................................................27
L. Tan, D. Cameron, C. McCorkell, Dublin City University,
Ireland

11:20-11:40
Disturbance Compensation for Nonlinear Chemical
Processes........................................................................33
W. Wu, Y. Chou, National Taiwan Institute of Technology,
Taipei, China

11:40-12:00
Input Saturation in Nonlinear Multivariable Processes
Resolved by Nonlinear Decoupling......................................39
J. G. Balchen, B. Sandrib, Norwegian Institute of Technology,
Trondheim, Norway

Session WM-2
Room: K3.17 - SKYE
Robotics I

Chairperson: C. Bonivento, University of Bologna, Italy
Co-Chairperson: P.M. Frank, University of Duisburg, Germany

10:00-10:20
Configuration Control of Rover-Mounted Manipulators
.......................................................................................47
H. Seraji, California Institute of Technology, Pasadena, USA

10:20-10:40
Augmented Models for Improving Vision Control of a
Mobile Robot.......................................................................53
G. L. Andersen, A. C. Christensen, O. Ravn, Technical
University of Denmark, Lyngby, Denmark

10:40-11:00
Parking a Vision-Guided Automobile Vehicle...................59
A. Driss, V. Rodrigues, P. Cohen, Ecole Polytechnique de
Montreal, Canada

11:00-11:20
Contribution of Fuzzy and Feedback Control to a Mobile
Robot Adaptative Navigation..........................................65
N. Pons, G. Bourdon, S. Delaplace, Centre Universitaire de
Technologie, Velizy, France

11:20-11:40
An Output Feedback Controller for Trajectory Tracking of
RLED Robots using an Observed Backstepping Approach
.......................................................................................71
S. Y. Lim, J. Hu, D. M. Dawson, Clemson University, USA
11:40-11:50 - Brief Paper
Robust Controller Design Based on Guaranteed Cost Control Approach for Rigid Robots ..................................77
J. Schäfers, CRP-HT, Luxembourg-Kirchberg, Luxembourg
S.J. Xu, M. Darouch, M. Zazzadzinski, CRAN-LARAL CNRS,
Longwy, France

11:50-12:00 - Brief Paper
Nonlinear Control of Multidrive Vehicular Robots ..........79
I. V. Miroshnik, A. V. Lyamin, Saint-Petersburg Institute of Fine Mechanics and Optics, Russia

Session WM-3
Room: K3.27 - RAASAY Aerospace I

Chairperson: J. O’Reilly, University of Glasgow, UK
Co-Chairperson: A. P. Oliva, Universidad da Beira Interior, Covilha, Portugal

10:00-10:20
A Preliminary Longitudinal Aircraft Control Design by Applying the Multivariable Frequency Matching Technique ..................................................83
L.R. Pujara, M. Shabbarhussein, Wright State University, Dayton, USA

10:20-10:40
A New Formulation of Nonlinear Inverse Dynamics for Aircraft Control ..............................................................89
X-D. Sun, T. Clarke, University of York, UK

10:40-11:00
Design of Robust Controllers for a 3-input 3-output Supersonic Aircraft Powerplant Using ICD ........................................95
M.A. Akbar, W.E. Leithhead, S.S. Robertson, University of Strathclyde, Glasgow, UK
J.O’Reilly, University of Glasgow, UK

11:00-11:20
Control of a High Performance Fighter Aircraft using Scheduled Local Nonlinear Control Laws .........................101
J. Wang, N. Sundararaj, Nanyang Technological University, Singapore

11:20-11:40
Presentation slot free (Original paper withdrawn)

11:40-12:00
Parallel Processing Systems for Passive Ranging During Helicopter Flight ...........................................................107
B. Sridhar, R.E. Suorsa, NASA Ames Research Center,
Moffett Field, USA

Session WM-4
Room: K3.14 - IONA Automotive I

Chairperson: G.C. Goodwin, University of Newcastle, Australia
Co-Chairperson: U. Kiencke, University of Karlsruhe, Germany

10:00-10:20
Spark-Ignition Engines Closed-Loop Control .................115
M. Karimifar, Shahid Bahonar University of Kerman, Iran

10:20-10:40
Self-tuning Control Applied to the In-Vehicle Calibration of a Spark Ignition Engine ...........................................121
R. E. Dorey, Ford Motor Company Ltd., Basildon, UK
G. Stuart, Cambustion Ltd., Cambridge, UK

10:40-11:00
Automation Strategies for a Particle Filter System for Diesel Engines .............................................................127
J. Kurth, H. Rake, RWTH Aachen, Germany

11:00-11:20
Nonlinear Modelling of a Turbocharged Diesel Engine .................................................................133
A. Rachid, Laboratoire des Systèmes Automatiques, Amiens, France
A. Liazid, J.C. Champoussin, Laboratoire de Machines Thermiques - ECL, Ecully, France

11:20-11:40
A Conception for the Integration of Modern Control Theory in Development and Quality Assurance of Automotive Components ........................................137
M. Hahn, Siemens AG, Essen, Germany

11:40-12:00
Robust Stability of Pilot Vehicle Directional Control ....141
M. S. Habib, University of Bahrain, Bahrain

Session WM-5
Room: SGBS:Level 4 - RHUM Neuro Control I

Chairperson: M. Heiss, University of Vienna, Austria
Co-Chairperson: M. Agarwal, Eidgenössische Technische Hochschule, Zürich, Switzerland
10:00-10:40 - Main Paper
A Systematic Classification of Neural-Network-Based Control
M. Agarwal, Eidgenössische Technische Hochschule (ETH), Zürich, Switzerland

10:40-11:00
Neural Networks For Non-Linear Control
O. Sørensen, Aalborg University, Denmark

11:00-11:20
A Photovoltaic Maximum Power Tracking Using Neural Networks
H. M. Mashaly, A. M. Sharaf, University of New Brunswick, Fredericton, Canada
M. Mansour, A. A. El-Sattar, Ain Shams University, Cairo, Egypt

11:20-11:40
Adaptive Fuzzy Neuro-Control with Application to a Water Bath Process
M. Khalid, S. Omatu, R. Yusof, University of Tokushima, Japan

11:40-12:00
A Performance Analysis of Various Neuro-Fuzzy Approaches for Controlling Nonlinear Systems
E. Teixeira, G. Laforga, H. Azevedo, Universidade Federal de Uberlândia, Brazil

Chairperson: U. Keuchel, Ruhr-University Bochum, Bochum, Germany
Co-Chairperson: M. Johnson, University of Strathclyde, Glasgow, UK

10:00-10:20
A Fuzzy Logic Controller for Wind Energy Utilization
H. M. Mashaly, A. M. Sharaf, University of New Brunswick, Fredericton, Canada
A. A. El-Sattar, M. Mansour, Ain Shams University, Cairo, Egypt

10:20-10:40
Speed Control of Wind Turbine in the Stall Region
T. Ekelund, Chalmers University of Technology, Göteborg, Sweden

10:40-11:00
Dynamic Friction Compensation in Servodrives
A. De Carli, S. Cong, D. Matacchioni, Università di Roma, Italy

11:00-11:20
On Automatic Voltage Regulator Design for Synchronous Generators
C.L. Braca, Centro Ricerca di Automatica, Milano, Italy
M.A. Johnson, University of Strathclyde, Glasgow, UK

11:20-11:30 - Brief Paper
Pole Assignment with Inequality Constraints on the Control Law
D. Mehdi, O. Guinard, ESIP-LARAL, Cosnes et Romain, France
M. Zasadzinski, CRAN-LARAL, Cosnes et Romain, France

11:30-11:40 - Brief Paper
Non-Linear System Robust Control-Application on a Stepping Motor
D. Bertaux, P. Bruniaux, V. Koncar, GEnie des Matériaux TETextiles, Ensaite de Roubaix, France
D. Pinchon, Université des Sciences et Technologies de Lille, Villeneuve d’Ascq, France

11:40-12:00
A Global Exponential Position Tracking Controller for a Permanent Magnet Stepper Motor Via Output Feedback
T. Burg, J. Hu, D. Dawson, P. Vedagarbha, Clemson University, USA

Chairperson: M. Grimble, University of Strathclyde, Glasgow, UK
Co-Chairperson: J. Salt, Universidade Politecnica de Valencia, Spain

10:00-10:20
A Fuzzy Logic Controller for Wind Energy Utilization
H. M. Mashaly, A. M. Sharaf, University of New Brunswick, Fredericton, Canada
A. A. El-Sattar, M. Mansour, Ain Shams University, Cairo, Egypt

10:20-10:40
Speed Control of Wind Turbine in the Stall Region
T. Ekelund, Chalmers University of Technology, Göteborg, Sweden
10:40-11:00
Modeling and Identification of Drive System Dynamics in a Variable Speed Wind Turbine..........................233
P. Novak, B. Schmidtbauer, Chalmers University of Technology, Göteborg, Sweden
I. Jovik, University College of Borås, Sweden

11:00-11:20
Design of a Controller for a Test-Rig for a Variable Speed Wind Turbine...........................................239
W.E. Leithead, M.C.M. Rogers, B. Connor, University of Strathclyde, Glasgow, UK
J.T.E. Pierik, T.G. Van Engelen, Netherlands Energy Research Foundation ECN, Petten, The Netherlands
J. O'Reilly, University of Glasgow, UK

11:20-11:40
Application of Nonlinear Control to a HAWT .........245
D.J. Leith, W.E. Leithead, University of Strathclyde, Glasgow, UK

11:40-11:50-Brief Paper
LQG Control of a Constant Speed Horizontal Axis Wind Turbine.................................................................251
B. Connor, W.E. Leithead, M.J. Grimble, University of Strathclyde, Glasgow, UK

11:50-12:00-Brief Paper
High Performance Angular-Velocity DC Electrical Drive Subject to a Periodical Type Load Torque and Some Parameter Changes..................................................253
P. Ostalczyk, Politechnika Łódzka, Poland

14:10-14:30
Robust Two-Step Controller Design for a High-Purity Distillation Column .............................................269
J. Pohlmeier, Technical University of Berlin, Germany

14:30-14:50
Closed-loop Identification of a Distillation Column ..........275
A.C. van der Klauw, G.E. van Ingen, R.A. de Callafon, Delft University of Technology, The Netherlands
A. van Rhijn, S. Olivier, ESSO Rotterdam, The Netherlands
P.P.J. van den Bosch, Eindhoven University of Technology, The Netherlands

14:50-15:10
-Optimal Advanced PID Control of an Industrial High Purity Distillation Column..........................281
H.E. Musch, M. Steiner, Eidgenössische Technische Hochschule, Zürich, Switzerland

15:10-15:30
Multilayered Neural Networks for Identification and Control of a Multivariable Distillation Process ..............289
H. Youal, A. Kada, M. Haloua, A. Majdoul, M. Ramzi, University Mohamed V of Rabat, Morocco

Session WA-1
Room: SGBS:Level 3 - MULL Process Control II

Chairperson: M. Polke, RWTH Aachen, Germany
Co-Chairperson: I. N. Vuchov, Higher Institute of Chemical Technology, Sofia, Bulgaria

13:30-13:50
Development and Application of a Novel Algorithm for Steady-State Optimising Control Using Dynamic Information.................................................................257
V. M. Becerra, P.D. Roberts, City University, London, UK
J. Lin, SAST Ltd., Brentford, UK

13:50-14:10
Adaptive Decoupling Control of Distillation Column......263
J. Macháček, J. Kotyk, University of Chemical Technology, Pardubice, Czech Republic

14:10-14:30
Experimental Results for a Robust Position and Force Controller Implemented on a Direct Drive Robot .......309
M.M. Bridges, J. Cai, D.M. Dawson, Clemson University, USA
M.T. Grabbe, BDM Engineering Services, Huntsville, USA
14:30-14:50
Practical Parallel Processing for Real-Time Adaptive Control of Mechanical Arms .............................................315
S.M. Ziauddin, A.M.S. Zalzala, University of Sheffield, UK

14:50-15:10
Optimal Hold and Moving Force/Torque for Dual-Arm and Multi-Arm Manipulator Holding Rigid Object ...............321
L. Chen, Chinese Naval Academy, Tsingyong Kaohsiung, Taiwan, China
G.P. Papavassilopoulos, University of Southern California, Los Angeles, USA

15:10-15:30
Coordinative Control of Two Spacerobots Based on Virtual Decomposition ..................................................327
W. Zhu, Y. Xi, Z. Zhang, Shanghai Jiaotong University, China

13:30-13:50
Design of Flight Control System for an Aerelastic Aircraft .................................................................335
F. Kubica, T. Livet, Aerospatiale, Toulouse, France

13:50-14:10
Performance Improvement by Feedforward: Application to Civil Aircraft Control Design .................................341
T. Livet, F. Kubica, Aerospatiale, Toulouse, France
J.-F. Magni, CERT DERA, Toulouse, France

14:10-14:30
A Study About Failures in the Feedback Paths of a Flight Control Law ........................................................347
A. P. Oliva, Universidade de Beira Interior, Covilha, Portugal

14:30-14:50
An Altitude Hold Autopilot Design to Work With an Observer-Based Stability Augmentation Control Law ............353
A. P. Oliva, Universidade de Beira Interior, Covilha, Portugal

14:50-15:10
J. Denham, S. Liebler, J. Renfrow, Naval Air Warfare Center, Aircraft Division, Patuxent River, USA

15:10-15:30
Non-Linear Control of a Flight Simulator Motion System ........................................................................365
A. R. Plummer, University of Leeds, UK

15:10-15:30
Session WA-4
Room: K3.14 - IONA
Automotive II

Chairperson: N. Munro, University of Manchester, UK
Co-Chairperson: J. B. Edwards, University of Sheffield, UK

13:30-13:50
Nonlinear Feedback and Robust Tracking Control of Articulated Vehicles ..................................................373
B. Jiang, X. Lui, X. Qi, S. Zhang, Northeast University, Shenyang - Liaoning, China

13:50-14:10
A Scanning Lidar System for Obstacle Avoidance in the Automotive Field ..................................................379
A. Najmi, A. Mahrane, D. Esteve, G. Vialaret, Laboratoire d'Automatique et d'Analyse des Systèmes, Toulouse, France

14:10-14:30
Stability and Maneuverability Analysis of Vehicle with Four Wheel Steering System ..................................385
A. Halanay, University of Bucharest, Romania
A. Ionita, Institute of Fluid Mechanics and Flight Dynamics, Romania
V. Rasvan, University of Craiova, Romania

14:30-14:50
A New Technique for Tracking the Features of a Spatially Distributed Field for Automatic Guidance ..........391
J.B. Edwards, R. Iqbal, University of Sheffield, UK

14:50-15:10
Robust Control of an Automatic Transmission System for Passenger Vehicles ............................................397
H. Furukawa, K. Hagiwara, Honda R & D Co. Ltd., Tochigi, Japan
M. Fujita, Japan Advanced Institute of Science and Technology, Ichikawa, Japan
K. Uchida, Waseda University, Tokyo, Japan

15:10-15:30
Enhancing Hydrostatic Gear Efficiency Through Nonlinear Optimal Control Strategies ..........................403
L. del Re, Å. Göransson, A. Astolfi, Eidgenössische Technische Hochschule, Zürich, Switzerland
Session WA-5
Room: SGBS:Level 4 - RHUM
Neuro Control II

Chairperson: M. Agarwal, Eidgenössische Technische Hochschule, Zürich, Switzerland
Co-Chairperson: D. A. Linkens, University of Sheffield, UK

13:30-13:50
An Integrated Robust/Neural Controller with Gas Turbine Applications
Q. Song, Nanyang Technological University, Singapore
J. Wilkie, M.J. Grimble, University of Strathclyde, Glasgow, UK

13:50-14:10
Self-Tuning Control of Bilinear Systems
M. Farsi, A. Abdulaziz, University of Newcastle upon Tyne, UK

14:10-14:30
Neural-Net Based Model-Free Self-Tuning Controller with On-Line Self-Learning Ability for Industrial Furnace
M. Zhao, Wuhan Iron & Steel University, Wuhan, China

14:30-14:50
Neural Network Based Model Predictive Control of a Continuous Neutralization Reactor
A. Draeger, H. Ranke, S. Engell, University of Dortmund, Germany

Session WA-6
Room: SGBS5.05 - UIST
Electrical Machines II

Chairperson: I. Dugard, Laboratoire d'Automatique de Grenoble, St Martin d'Hères, France
Co-Chairperson: M. Daniels, University of Dayton, USA

13:30-13:50
Presenation slot free (Original paper withdrawn)

13:50-14:10
A Nonlinear Positioning Controller for an Induction Motor
E. Liceaga-Castro, University of Strathclyde, Glasgow, UK
I. Siller-Alcala, University of Glasgow, UK

14:10-14:30
Designing a Flux Observer for Induction Machines
A. Medvedev, C. Zell, Luleå University of Technology, Sweden

14:30-14:50
Adaptive Nonlinear Control of a Permanent Magnet Synchronous Motor
L. Ben Amor, M. Ghribi, L.A. Dessaint, O. Akhrif, Ecole de Technologie Supérieure, Montréal, Canada

15:10-15:30
Control Techniques for Synchronous Motor with Flexible Shaft
S. Di Gennaro, M. Tursini, Università di L'Aquila, Poggio di Roio, Italy

Session WA-7
Room: K3.26 - COLL
Power Systems

Chairperson: H. A. Nour Eldin, University of Wuppertal, Germany
Co-Chairperson: P. Vadstrup, Power Electronics R & D, Denmark

13:30-13:50
Presentation slot free (Original paper withdrawn)

13:50-14:10
Automation of Reactive Power Compensation in Industrial Power Systems
P. Ekel, S. Ansuj, R. Schinzinger, Federal University of Santa Maria, Brazil
A. Prakhovnik, O. Razumovsky, Kiev Polytechnical Institute, Ukraine

14:10-14:30
Consideration of Excitation Control for Transient Stability Assessment
S.K. Tso, S.P. Cheung, University of Hong Kong, Hong Kong
16:40-17:00
Model Certainty in Optimising Control
J.E. Ellis, S. Lopez, P.D. Roberts, City University, London, UK

17:00-17:20
Control Schemes for a Cyclically Operating Aluminium Extruder Plant
M. Pandit, Kaiserslautern University, Germany
K. Buchheit, Alusingen GmbH, Singen, Germany

17:20-17:30 - Brief Paper
Vulcanization Process: A Stochastic Method for Identification and Control Problem
L. Autrique, Laboratoire d’Automatique de Nantes, France
J. E. S. de Cursi, Institut de Mecanique de Rouen, France

17:30-17:40 - Brief Paper
A Fuzzy Simulation Model for Production Control in a Semiconductor Wafer Manufacturing
C. Azzaro, P. Floquet, L. Pibouleau, S. Domenech, Laboratoire de Génie Chimique, Toulouse, France

18:00-18:00
Session WE-2
Room: K3.17 - SKYE
Robotics III

Chairperson: J. van Amerongen, University of Twente, The Netherlands
Co-Chairperson: H. Seraji, California Institute of Technology, Pasadena, USA

16:00-16:20
Laboratory Implementation of Fuzzy Logic Position Controller for a Single-Link Robotic Manipulator
F. M. El-Khouly, A. M. Sharaf, University of New Brunswick, Fredericton, Canada
A. S. Abdel-Ghaffar, A. Mohammed, Menoufia University, Shebin El-kom, Egypt

16:20-16:40
Stability Issues in a Disturbance Attenuation Based Technique for Manipulator Control
I. P. W. Sillitoe, S. Szumko, Loughborough University of Technology, UK
H. Kreidie, University of Laval, Canada
16:40-17:00
On the Robust Control of Robot Manipulators Including Actuator Dynamics
C. Su, Y. Stepanenko, University of Victoria, Canada

17:00-17:20
A New Control Method Applied to Robots with Joint Elasticity
K.A. Tahboub, Hebron Technical Engineering College, Palestine
P. C. Müller, University of Wuppertal, Germany

17:30-17:40 - Brief Paper
Presentation slot free (Original paper withdrawal)

16:40-17:00
Design and Analysis of the Nonlinear Feedback Linearizing Controller for an EMS System
S.J. Joo, J.J. Byun, H. Shim, J. H. Seo, Seoul National University, Korea

17:00-17:20
State Variable Constraints on the Performance of Optimal Maglev Suspension Controllers
J.E. Paddison, C. MacLeod, R.M. Goodall, Loughborough University of Technology, UK

17:20-17:40
H Control of Magnetic Suspension System
F. Zhang, K. Suyama, Tokyo University of Mercantile Marine, Japan

Session WE-3
Room: K3.27 - RAASAY
Magnetic Levitation Systems

Chairperson: D. van Schrick, University of Wuppertal, Germany
Co-Chairperson: S. D. Katebi, Shiraz University, Iran

16:00-16:20
H Control of a Magnetic Bearing
S. Font, G. Duc, École Supérieure d'Électricité Plateau de Moulon, Gif sur Yvette, France
F. Carrère, Soc. de Mécanique Magnétique, Saint Marcel, France

16:20-16:40
A MISO Sliding Mode Control for a High Speed EMS MAGLEV-Vehicle using Disturbance Estimation
M. Kozeck, G. Puchhammer, H.-P. Jörgl, Vienna University of Technology, Austria

16:40-17:00
Monitoring of Friction Coefficient Between Tyre and Road Surface
St. Germann, M. Württenberger, Technische Universität Darmstadt, Germany
A. Daida, University Karlsruhe, Germany

16:20-16:40
An Original Braking Controller with Torque Sensor
Y. Chamaillard, G. Gissinger, J.M. Perronne, M. Renner, École Supérieure des Sciences Appliquées de Mulhouse, France

17:00-17:20
Comparative Diagnosis of Tyre Pressures
H. Mayer, University Karlsruhe, Germany

17:20-17:40
Control of SI-Engines with CVTs - A Feedback Linearization Approach
L. Guzella, A. Schmid, ETH, Zürich, Switzerland

16:40-17:00
System Control Application for an Electric Hybrid Vehicle
H. Wallentowitz, RWTH Aachen, Germany
R. Ludes, AFT Atlas Fahrzeugtechnik GmbH, Werdohl, Germany
A Comparative Study of Two Fuzzy Control Systems Design
S. D. Katebi, M. Makrehchi, Shiraz University, Shiraz, Iran

Decomposed Fuzzy Control of Power Systems
A. E. Gegov, University of Duisburg, Germany
H.-J. Nern, University of Wuppertal, Germany

A Fuzzy Control Application to Waste Water Treatment Plants
J. Alex, U. Jumar, R. Tschepetzki, Institut für Automation und Kommunikation Magdeburg, Germany

Fuzzy Logic Based Optimization of a Phosphoric Acid Plant - Experiences
M. Ketonen, Kemira Engineering OY, Helsinki, Finland

Fuzzy PI Control Algorithm for the Multiple Effect Evaporation Station
A. Zdravkovic, N. Marsenic, Lola Institute, Beograd, Yugoslavia
S. Turajlic, University of Beograd, Yugoslavia

A Self-regulating Scaling Method for Fuzzy Control
J.A. Dunlop, K.J. Burnham, D.J.G. James, P.J. King, Coventry University, UK

Recommended Control Configurations for DC Drives with Flexible Shafts
H. A. Youssef, S. M. El Saied, O. A. Sebakhy, Alexandria University, Egypt

Speed Control of a DC Motor Using Binary Rate Modulation of the Input Power
N. Barry, D. Canny, Cork Regional Technical College, Ireland
E. McQuade, University of Limerick, Ireland

Position-Velocity Tracking Control of a Brushless DC Motor via an Observed Integrator Backstepping Approach
J. Hu, D. M. Dawson, K. Anderson, Clemson University, USA

An Adaptive Partial State Feedback Controller for RLED Robot Manipulators
T. Burg, D. Dawson, J. Hu, M. Queiroz, Clemson University, USA

Identification of Asynchronous Machine Parameters by a Recursive Least-Squares Method
H. Guesbaoui, O. Touhami, C. Iung, Université de Nancy, Vandoeuvre, France

Local Vector Control of an AC Drive System Load Simulator
R.E. Betz, H.B. Penfold, R.W. Newton, University of Newcastle, Callaghan, Australia

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R.E. Betz, H.B. Penfold, R.W. Newton, University of Newcastle, Callaghan, Australia
16:40-17:00
Modelling and Control of Generating Units using Neural Network Techniques........................................735
M. D. Brown, G. W. Irwin, B. W. Hogg, E. Swidenbank,
Queen's University of Belfast, UK

17:00-17:20
An Example of Multivariable Combustion Control Design Within Individual Channel Design Framework........741
J. Kocijan, University of Ljubljana, Slovenia
J. O'Reilly, University of Glasgow, U.K.

17:20-17:40
Adaptive Predictive Control in a Thermal Power Station .................................................................747
L. Pérez, J. Cerezo, J.M. Martin-Sánchez, SCAP Europa,
Madrid, Spain
F.J. Pérez, J. Catediano, Central Térmica de Pasajes de San Juan, Guipúzcoa, Spain

17:40-18:00
Selftuning Cascade Temperature Control.................................................................753
A. Buschini, L. Ferrarini, C. Maffezzoni, Politecnico di Milano, Italy

10:05-10:25
Model-Based Computer Control of Kappa Number in Magnefite Pulp Cooking......................................775
D. Juricic, Joze Stefan Institute, Ljubljana, Slovenia

10:25-10:45
Robust Control Under Variable Flow and Volume ..........781
L. Tian, A.J. Niemi, R. Ylinen, Helsinki University of Technology, Finland

10:45-11:05
Pressure Control for Servopneumatic Actuators - A Bang-Bang like Approach and Signal Smoothing by CSMC....787
G. Puchhammer, H.P. Joergl, Technical University of Vienna, Austria

11:05-11:15 - Brief Paper
Minimum-Time Liquid Level Control........................................793
W. Grega, Technical University of Mining and Metallurgy, Kraków, Poland

11:15-11:25 - Brief Paper
Optimal Control of Gas Transportation Systems..............795
A. J. Osiadacz, Warsaw University of Technology, Poland
S. Święczewski, Institute of Petroleum and Gas Engineering, Kraków, Poland

THURSDAY MORNING
25th August, 1994

8:30 - 9:15
PLENARY SESSION
Room: K3.25 - TIREE

"Sensor, Actuator and Loop Validation for Process Control"
Professor David W. Clarke
University of Oxford (UK)........................................761

Session TM-1
Room: SGB5:Level 3 - MULL
Process Control IV

Chairperson: J.E. Rijnsdorp, Twente University of Technology, The Netherlands
Co-Chairperson: D. W. Clarke, University of Oxford, UK

9:45-10:05
Multivariable Nonlinear Control of a Paper Machine Headbox....................................................769
D. G. Sbarbaro, University of Concepción, Chile
R. W. Jones, University of Auckland, New Zealand

10:05-10:25
Parallel Processing in Real-Time Control: A State-of-the-Art Report...............................................799
D. Popovic, University of Bremen, Germany

10:05-10:25
Transputer based High-performance Instrumentation and Control Systems (THICS)............................789
N. Krishnan, M.R. Rajagopal, ER & DC, Thiruvananthapuram, India

10:25-10:45
Interfacing Parallel Computers to Fiber-Optic Communication Links for Plant Automation..................805
H. Westphal, University of Bremen, Germany
10:45-11:05
Computer Aided Support for Designing Parallel Real-Time Solutions on Transputer-based Systems
M. van Steen, A. Ten Dam, T. Vogel, Erasmus University, Rotterdam, The Netherlands

11:05-11:25
An Application of Parallel Processing to Distributed Real Time Control of Aircraft Testing
G. Burnett, P. Morris, A. Patterson, I. Powlesland, B. Roelofs, Department of Defence, Melbourne, Australia

11:25-11:45
Simulation of Parallel Time-critical Programs with the DYNAMO System
A. Biriukov, D. Ulyanov, Computing Centre of the Russian Academy of Sciences, Moscow, Russia

11:45-12:05
Quaternion Feedback Regulation of Underwater Vehicles
O.-E. Fjellstadt, T.I. Fossen, Norwegian Institute of Technology, Trondheim, Norway

Session TM-3
Room: K3.27 - RAASAY
Marine Control I

Chairperson: J. van Amerongen, University of Twente, The Netherlands
Co-Chairperson: J. G. Balchen, Norwegian Institute of Technology, Trondheim, Norway

9:45-10:05
Presentation slot free (Original paper withdrawn)

10:05-10:25
Design Multivariable Control for a Ship Based on Robust Methodology
M.J. Lopez, Universidad de Cadiz, Spain
F.R. Rubio, Universidad de Sevilla, Spain

10:25-10:45
Roll Damping by Rudder Control - A New H Approach
J. Stoustrup, H.H. Niemann, Technical University of Denmark, Lyngby, Denmark
M. Blanke, Aalborg University, Denmark

10:45-11:05
Farn Based Controller as Kalman Filter Alternative Applied to Ship's Dynamic Positioning Control
R. F. Garcia, Universidad de La Coruna, Spain

11:05-11:25
The Control System of an Autonomous Underwater Vehicle
B. Jalving, N. Storkersen, Norwegian Defence Research Establishment, Kjela, Norway

11:25-11:45
Quaternion Feedback Regulation of Underwater Vehicles
O.-E. Fjellstadt, T.I. Fossen, Norwegian Institute of Technology, Trondheim, Norway

Session TM-4 (invited)
Room: K3.14 - IONA
Fault Detection I

Organizer: P. Frank, University of Duisburg, Germany
Chairperson: P. Frank, University of Duisburg, Germany
Co-Chairperson: R.J. Patton, University of York, UK

9:45-10:05
Comparison of Identification and Parity Space Approaches for Failure Detection in Single Input Single Output Systems
G. Delmaire, J.-P. Cassar, M. Staroswiecki, Universite des Sciences et Technologies de Lille, France

10:05-10:25
Detecting Incipient Sensor Faults in Flight Control Systems
R.J. Patton, University of York, UK

10:25-10:45
Fault Diagnosis in Complex Systems using Artificial Neural Networks
S. Tzafestas, P. Dalianis, National Technical University of Athens, Greece

10:45-11:05
Fault Diagnosis in Systems using Fuzzy Logic
D. Sauter, N. Mary, F. Sirou, A. Thielgen, Centre de Recherche en Automatique de Nancy, Vandoeuvre, France

11:05-11:25
A Comparison of IFD Schemes
D. van Schrick, Bergische Universitat Wuppertal, Germany

11:25-11:45
Applying Bayesian Networks to Fault Diagnosis
K. Kroschel, H. Kirsch, Universitat Karlsruhe, Germany

Session TM-5
Room: SGBS4:Level 4 - RHUM
Adaptive Control I

Chairperson: L. Dugard, Laboratoire d'Automatique de Grenoble, St. Martin d'Heres, France
Co-Chairperson: A. van Cauwenberge, University of Gent, Belgium
9:45-10:05  
Presentation slot free (Original paper withdrawn)

10:05-10:25  
Furnace Temperature Control by Self-Tuning Control Theory ................................. 903
S. Omata, K. Shinohara, University of Tokushima, Japan
K. Iwasa, Anan Technical College, Japan

10:25-10:45  
Adaptive Non-Linear Control of a Real-Life Fermentation Process ............................. 909
G. Roux, B. Dahhou, Centre National de la Recherche Scientifique, Toulouse, France

10:45-11:05  
Application of Adaptive Tracking Control to Industrial Robots .................................. 915
R. Colbaugh, K. Glass, New Mexico State University, Las Cruces, USA
H. Seraji, California Institute of Technology, Pasadena, USA

11:05-11:25  
Self-Tuning Speed Regulator For CVC Induction Motor Drive .................................... 921
N. Bidstrup, H. Rasmussen, T. Knudsen, Aalborg University, Denmark

11:25-11:45  
Modelling and Application of Adaptive Control to a Gas Heater .................................. 927
S. Claquin, A. Carriere, F. Rocaries, LATIS - ESIEE, Noisy Le Grand, France

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9:45-10:05  
Advanced Control System Design, An Overview......................................................... 935
C.J. Herget, C.F. Lin, American GNC Corporation, Canoga Park, USA

10:05-10:25  
Spacecraft Attitude Control Using Nonlinear Servomechanism Theory .......................... 941
J. Huang, C.F. Lin, American GNC Corporation, Canoga Park, USA
F.Y. Hadaegh, R.Y. Chiang, California Institute of Technology, Pasadena, USA

10:25-10:45  
Advanced Integrated Control of Nonlinear Flexible Pointing Systems .......................... 947
S. Banks, N. Coleman, Army Armorment Research, Development and Engineering Center, Picatinny Arsenal, USA
C.F. Lin, T.J. Yu, American GNC Corporation, Canoga Park, USA

10:45-11:05  
Noninteracting Control of Robotic Space Vehicles ....................................................... 953
A. Jain, G. Rodriguez, California Institute of Technology, Pasadena, USA

11:05-11:25  
Structural Vibration Suppression Using Fuzzy Logic Control ....................................... 959
F.Y. Hadaegh, R.Y. Chiang, California Institute of Technology, Pasadena, USA
C.F. Lin, A.S. Politopoulos, American GNC Corporation, Canoga Park, USA

11:25-11:45  
Missile Autopilot Design Using Dynamic Inversion and Structured Singular Value Synthesis ......................................................... 965
M.B. McFarland, C.N. D'Souza, U.S. Air Force, Eglin AFB, USA

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Session TM-7  
Room: K3.26 - COLL Electromechanical/Electrohydraulic Systems

Chairperson:  P. Roberts, City University, London, UK
Co-Chairperson:  K.-D. Leimbach, University of Kassel, Germany

9:45-10:05  
Vibration Reduction Techniques for High Speed Passenger Elevators ............................. 965
K. Nai, W. Forsythe, R.M. Goodall, Loughborough University of Technology, UK

10:05-10:25  
Robust Control for Carriage Drum Printer ................................................................. 971
R.E. Knight, W. Kolodziej, Oregon State University, Corvallis, USA
10:25-10:45
Gemini 8m Telescope-Structural Simulation and Wind Loading Study ............................................................... 977
M.S. Davies, S.G. Hutton, University of British Columbia, Vancouver, Canada
R. McGonegal, Gemini 8-M Telescopes Project, Tucson, USA

10:45-11:05
H Design Using Normalized Comprime Factors: An Application to an Electromechanical Actuator ................. 983
O. Malasse, C. Iung, ENSEM, Vandoeuve les Nancy, France
M. Zazadzinski, M. Hayer, M. Darouach, Université de Nancy, Cosnes et Romain, France

11:05-11:25
Application of Adaptive Control to an Unstable Mechanical Plant ............................................................... 989
N.M. Filatov, U. Keuchel, H. Unbehauen, Ruhr-University Bochum, Germany

11:25-11:45
Input/Output Linearization Control of an Electro Servo-Hydraulic Actuator ..................................................... 995
H. Hahn, A. Piepenbrink, K.-D. Leimbach, University of Kassel, Germany

13:15 - 14:00
PLENARY SESSION
Room: K3.25 - TIREE

"Multivariable Statistical Monitoring and Diagnosis of Process Operating Performance"
Professor John MacGregor
Mc Master University (Canada) [1001]

14:00-14:20
Identification and Control of Nutrient Removing Processes in Wastewater Treatment Plants ......................... 1005
M.K. Nielsen, H. Madsen, J. Carstensen, Technical University Denmark, Lyngby, Denmark

14:20-14:40
Identification of Wastewater Biodegradation Kinetics .................................................................................. 1011
H. Spanjers, K. Keesman, Wageningen Agricultural University, The Netherlands

14:40-15:00
The Adaptive Sensor Concept: On-line Modelling of the Activated Sludge Process with Optimal Insensor-Experiments ......................................................... 1017
P. van Rolleghem, Laboratory for Microbial Ecology, University of Gent, Belgium

15:00-15:20
Simulation: A Key Component in the Development of an Integrated Computer-based Approach to Wastewater Treatment Plant Control ........................................... 1023
G. Patry, I. Takacs, University of Ottawa, Canada

15:20-15:40
Some Aspects of Control Loop Performance Monitoring ............................................................................ 1029
P-G Eriksson, A.J. Isaksson, Royal Institute of Technology, Stockholm, Sweden

15:40-16:00
Modelling the Dynamics of a Trickling Filter for Waste Water Treatment ....................................................... 1035
T. Wik, C. Lindeborg, Chalmers University of Technology, Gothenborg, Sweden

14:00-14:20
Parallel Processing for Real-Time Robot Manipulator Control ........................................................................ 1043
H. Lecocq, Z. Zheng, P. Beaujean, University of Liège, Belgium

14:20-14:40
A Transputer Network of Real-Time Control of an Intelligent Mobile Robot ................................................... 1049
H. Hu, J.M. Brady, F. Du, P.J. Probert, University of Oxford, UK

14:40-15:00
Hardware Architecture for Transputer-based Embedded Control .................................................................... 1055
P.K. Sinha, K. Mutib, University of Reading, UK
15:00-15:20
Real-Time Control of a Robot Using Neural Networks
F. Declercq, F. Dumortier, R. Dekeyser, A. van Cauwenbergh, University of Gent, Belgium

15:20-15:40
Prediction in Real-Time Control Using Adaptive Networks with On-Line Learning
W. Brockmann, O. Huwendiek, Universität-GH-Paderborn, Germany

15:40-16:00
Parallel Implementations of Kalman Filters for Tracking Applications onto Transputer Networks
B.A. White, M.K. El-Mahy, Royal Military College of Science, Wiltshire, UK

Session TA-3 (invited)
Room: K3.27 - RAASAY
Marine Control II

Organizer: D. Wood, Brown Brothers, Edinburgh, UK
Chairperson: D. Wood, Brown Brothers, Edinburgh, UK
Co-Chairperson: C.G. Källström, SSPA Maritime Consulting, Göteborg, Sweden

14:00-14:20
Advanced Controller for Underwater Manipulator
T.J. Larkum, Technical Software Consultants Ltd., London, UK
D.R. Broome, University College, London, UK

14:20-14:40
Integrated Ship Control Using H Robust Design Techniques
M.R. Katebi, S.A. Carr, M.J. Grimble, University of Strathclyde, Glasgow, UK

14:40-15:00
Dynamic Compensation System
C.G. Källström, K. Theoren, SSPA Maritime Consulting, Göteborg, Sweden

15:00-15:20
Rudder Roll Stabilisation: An Improved Control Law
R. Melville, Brown Brothers, Edinburgh, UK
C.G. Källström, K. Theoren, SSPA Maritime Consulting, Sweden

15:20-15:40
Robust Fin/Rudder Ship Roll Stabilisation
M.T. Sharif, G.N. Roberts, R. Sutton, Royal Naval Engineering College, Plymouth, UK

Session TA-4 (invited)
Room: K3.14 - IONA
Fault Detection II

Organizer: R. J. Patton, University of York, UK
Chairperson: R. J. Patton, University of York, UK
Co-Chairperson: P. Frank, University of Duisburg, Germany

14:00-14:20
Non-linear Observer-Based Fault Detection
K. Adjallah, D. Maquin, J. Ragot, Centre de Recherche en Automatique de Nancy, Vandoeuvre, France

14:20-14:40
Estimation of Parity Equations in Nonlinear Systems
T. Höfling, R. Deibert, Technical University of Darmstadt, Germany

14:40-15:00
Fuzzy Logic Based Threshold Adaption for Fault Detection in Robots
H. Schneider, P.M. Frank, Universität-GH-Duisburg, Germany

15:00-15:20
On-line Classification of Acoustic Burst Signals by a Neural Network - Application to Loose Parts Monitoring in Nuclear Power Plants
B. Olma, D. Wach, Institut für Sicherheitstechnologie GmbH, Garching, Germany

15:20-15:40
Towards an Object Approach for Quality Monitoring and Diagnosis on a Galvanizing Line
S. Roth, F. Sirou, G. Bloch, T. Cecchin, Centre de Recherche en Automatique de Nancy, Vandoeuvre, France

15:40-16:00
The Sensitivity of Diagnostic System to the Changes of the Set of Measuring Signals
J.M. Koscielny, P. Wasiewicz, Warsaw University of Technology, Poland

Session TA-5
Room: SGBS:Level 4 - RHUM
Adaptive Control II

Chairperson: J. van Amerongen, University of Twente, The Netherlands
Co-Chairperson: H. Unbehauen, Ruhr-University Bochum, Germany

14:00-14:20
Adaptive Neuro-Control for Spacecraft Attitude Control
K. KrishnaKumar, University of Alabama, Tuscaloosa, USA
### Session TA-6
**Room:** SGBS5.05 - UIST  
**Controller Design I**

**Chairperson:** D.P. Atherton, University of Sussex, Brighton, UK  
**Co-Chairperson:** J. McGhee, University of Strathclyde, Glasgow, UK

#### 14:00-14:20
**Control Synthesis of Systems with Hereditary Properties**
- P. Zitek, Czech Technical University of Prague, Czech Republic

#### 14:20-14:40
**Nonlinear Control Design Using the Gate Function Approach**
- J. C. Kalkkühl, M. R. Katebi, University of Strathclyde, Glasgow, UK

### Session TA-7 (invited)
**Room:** K3.26 - COLL  
**Learning Control**

**Organizer:**  M. Heiss, TU Vienna, Austria  
**Chairperson:** M. Heiss, TU Vienna, Austria  
**Co-Chairperson:** R. M. Sanner, University of Maryland, USA

#### 14:00-14:30 - Main Paper
**Function Approximation, "Neural" Networks, and Adaptive Nonlinear Control**
- R.M. Sanner, University of Maryland, College Park, USA  
- J.-J.E. Slotine, Massachusetts Institute of Technology, Cambridge, USA

#### 14:30-14:50
**Sparse Data Interpolation for Selflearning Cavitation Control**
- M. Simmler, M. Pottmann, H.P. Jörgl, University of Technology, Vienna, Austria

#### 14:50-15:10
**Associative Datafields in Automotive Control**
- M. Schmitt, Robert Bosch AG, Stuttgart, Germany  
- T. Ullrich, H. Tolle, TH Darmstadt, Germany

#### 15:10-15:30
**Fuzzy Control and Neural Networks - Industrial Applications in the World of PLCs**
- H. Wegmann, Siemens AG, Nürnberg, Germany
15:30-15:50
Selflearning Fuzzy Controller with Smooth Transfer Characteristic and Guaranteed Convergence 1251
M. Heiss, J. Leichtfried, University of Technology, Vienna, Austria

15:50-16:10
Characteristics of the Time-Optimal Control of Flexible Structures with Damping 1299
L. Y. Pao, Northwestern University, Evanston, USA

16:10-16:30
H Control Synthesis for a Flexible Structure 1305
R. N. Banavar, Indian Institute of Technology, Bombay, India

16:30-16:50
Variable Structure Control Application for Flexible Manipulators 1311
A. R. Ingole, B. Bandopadhyay, Indian Institute of Technology, Bombay, India
R. Goren, Center for Systems Engineering and Applied Mechanics, Louvain-la-Neuve, Belgium

16:50-17:10
On-line Quality Control of a Continuous Stirred Tank Polymerization Reactor 1277
D. Böhm, Technical University of Berlin, Germany
H. Rock, Christian-Albrechts-University, Kiel, Germany

17:10-17:30
Robust Controller Design for Flexible Robot Manipulators: An Optimal Output Feedback Controller Design Approach 1323
A. Iftar, Anadolu University, Eskisehir, Turkey

17:30-18:10
Optimal Control for Fractionally Damped Flexible Systems 1329
B. Mbojde, G. Montseny, J. Audouinet, P. Benchimol, Centre National de la Recherche Scientifique, Toulouse, France

16:30-16:50
Visual Programming of On-line Systems for Continuous Process Improvement 1289
S. Freleigh, Gensym Corporation, Cambridge, USA

16:50-17:10
Selflearning Fuzzy Controller with Smooth Transfer Characteristic and Guaranteed Convergence 1251
M. Heiss, J. Leichtfried, University of Technology, Vienna, Austria

16:30-16:50
Characteristics of the Time-Optimal Control of Flexible Structures with Damping 1299
L. Y. Pao, Northwestern University, Evanston, USA

Session TE-1 (invited)
Room: SGBS:Level 3 - MULL
Quality Control

Organizer: A.J. Morris, University of Newcastle upon Tyne, UK
Chairperson: A.J. Morris, University of Newcastle upon Tyne, UK
Co-Chairperson: I.N. Vuchkov, Higher Institute of Chemical Technology, Sofia, Bulgaria

16:30-16:50
Process Control by Quality Charting 1259
Z. Bluvsband, Advanced Logistics Department, Rishon Lezion, Israel
P. Grabov, Israel Institute for Technology, Haifa, Israel

16:50-17:10
Computer-Aided Quality Improvement 1265
I.N. Vuchkov, L.N. Boyadjieva, Higher Institute of Chemical Technology, Sofia, Bulgaria

17:10-17:30
Neural Networks and Nonlinear SPC 1271
M. Ignova, J. Glassey, G.A. Montague, A.J. Morris, University of Newcastle upon Tyne, UK
C. Kiparisides, University of thessaloniki, Greece

17:30-17:50
On-line Quality Control of a Continuous Stirred Tank Polymerization Reactor 1277
D. Böhm, Technical University of Berlin, Germany
H. Rock, Christian-Albrechts-University, Kiel, Germany

17:50-18:10
Modelling and Analysing the Generalized Interaction 1283
C. Hirotsu, University of Tokyo, Japan

18:10-18:30
Optimal Control for Fractionally Damped Flexible Systems 1329
B. Mbojde, G. Montseny, J. Audouinet, P. Benchimol, Centre National de la Recherche Scientifique, Toulouse, France

Session TE-2
Room: K3.17 - SKYE
Flexible Structure Systems

Chairperson: J. Wilkie, University of Strathclyde, Glasgow, UK
Co-Chairperson: C. J. Herget, American GNC Corporation, Canoga Park, USA

16:30-16:50
Characteristics of the Time-Optimal Control of Flexible Structures with Damping 1299
L. Y. Pao, Northwestern University, Evanston, USA

16:50-17:10
H Control Synthesis for a Flexible Structure 1305
R. N. Banavar, Indian Institute of Technology, Bombay, India

17:10-17:30
Variable Structure Control Application for Flexible Manipulators 1311
A. R. Ingole, B. Bandopadhyay, Indian Institute of Technology, Bombay, India
R. Goren, Center for Systems Engineering and Applied Mechanics, Louvain-la-Neuve, Belgium

17:30-17:50
On-line Quality Control of a Continuous Stirred Tank Polymerization Reactor 1277
D. Böhm, Technical University of Berlin, Germany
H. Rock, Christian-Albrechts-University, Kiel, Germany

17:50-18:10
Robust Controller Design for Flexible Robot Manipulators: An Optimal Output Feedback Controller Design Approach 1323
A. Iftar, Anadolu University, Eskisehir, Turkey

18:10-18:30
Optimal Control for Fractionally Damped Flexible Systems 1329
B. Mbojde, G. Montseny, J. Audouinet, P. Benchimol, Centre National de la Recherche Scientifique, Toulouse, France

Session TE-3
Room: K3.27 - RAASAY
CAD-Tools

Chairperson: A. van Cauwenberghe, University of Gent, Belgium
Co-Chairperson: U. Keuchel, Ruhr-University Bochum, Germany

16:30-16:50
BLOCKSIM - Application of Non-linear Modelling and Simulation in Fuzzy Control System Design 1337
M. Winter, R. Schockenhoff, H.Pu, H.A. Nour Eldin, University of Wuppertal, Germany

xxiv
16:50-17:00 - Brief Paper
A Knowledge Managed Multicontroller Structure Using Clips
H.H. Abdalla, K.Z. Karam, M. Farsi, University of Newcastle Upon Tyne, UK

17:00-17:10 - Brief Paper
Multivariable Process Monitoring and Forecasting by Projection Methods
H. Fridén, C. Wikström, Umetri AB, Umeå, Sweden

17:10-17:30
Functional Specification of Industrial Control Systems, An object-oriented approach
G. Ericsson, Royal Institute of Technology, Stockholm, Sweden

17:30-17:50
An Object-Oriented Environment for Control Systems in Oil Industry
W.C. Amaral, L.V.R. Arruda, R. Lüders, F.A.C. Gomide, UNICAMP, Campinas, Brazil

17:50-18:10
Robust Control Under Physical Parameter Uncertainties: Solvability Tests and Synthesis Procedures Based on a CAD Approach
O.M. Grasselli, Università di Roma, Italy
S. Langhi, C. Traversari, Università di Ancona, Italy
A. Tomambe, Politecnico di Torino, Italy

18:10-18:20 - Brief Paper
The Intellectual Environment of a Computer Aided Control System Design (CACSD) Project
A. Hamdi-Cherif, Université-Pierre-et-Marie-Curie, Paris, France

16:50-17:10
Fault Detection for Bilinear Systems with Application to a Hydraulic System
D. Yu, D. N. Shields, J. L. Mahtani, Coventry University, UK

17:10-17:30
Application to the Sensors and Actuators Fault Detection
N. Zbiri, Université Evry Val d'Essonne, France
M. Vergé, Lab. d'Automatique des Arts et Métiers, Paris, France

17:30-17:50
A Solution to the Segmentation Problem Based on Dynamic Programming
G.F. Bryant, Imperial College of Science, London, UK
S.R. Duncan, Control Systems Centre UMIST, Manchester, UK

17:50-18:10
A Fault Detection and Accommodation Method Applied to an Inverted Pendulum
H. Noura, D. Sauter, C. Aubrun, Université de Nancy, Vandoeuvre, France

18:10-18:30
Explicit Modelling of the Stator Winding Bar Water Cooling for Model-Based Fault Diagnosis of Turbogenerators with Experimental Verification
F. Fischer, H.-J. Nern, H.A. Nour Eldin, University of Wuppertal, Germany
L. Lathchev, Bulgarian Academy of Sciences, Sofia, Bulgaria

16:30-16:50
Decentralized Adaptive Control for a Water Distribution System
D. Georges, Laboratoire d'Automatique de Grenoble, St. Martin d'Hères, France
16:50-17:10
Bounded Real Property of Time-Delay Time-Varying Systems and Its Application to Learning Control 1417
S. Yashiki, N. Matsumoto, T. Endo, Meiji University, Kawasaki, Japan
T. Takahashi, Fukuoka Institute Technology, Fukuoka-shi, Japan

17:10-17:30
A Design Method for Sampled-Data I-PD Control Systems and Its Application to Self-Tuning Control of Cement Raw Meal Process 1423
K. Suyama, Tokyo University of Mercantile Marine, Japan
T. Aizawa, N. Takechi, Onoda Cement Co. Ltd., Japan

17:30-17:50
Auto-Tuning PID Control Using Neural Predictor to Compensate Large Time-Delay 1429
Y. Tan, R. De Keyser, University of Gent, Belgium

17:50-18:10
Practical Automatic Tuning Methods of PID Controllers for a Sour Water Stripper 1435
F.G. Jota, Federal University of Minas Gerais, Belo Horizonte, Brazil
E.M. Jardim, Gabriel Passos Refinery, Petrobrás, Betim, Brazil

18:10-18:20 - Brief Paper
An Improved Hybrid Adaptive PID Controller System for Turning 1441
F.J. Carrillo, K. Haddouche, Ecole Nationale d'Ingenieurs de Tarbes E.N.I.T., Tarbes, France

18:20-18:30 - Brief Paper
Self-Tuning Controller for Temperature Control of a Thermo-Analyser 1443
V. Bobel, M. Kubalcik, Technical University of Brno, Czech Republic

16:50-17:10
Application of Polynomial Methods to Design of Controllers for Clos Guidance Systems 1453
N.E. Parkes, A.P. Roberts, Queen's University of Belfast, UK

17:10-17:30
Digital Controller Improvement by Multirate Control 1459
J. Salt, P. Albertos, J. Tornero, Universidad Politécnica de Valencia, Spain
B. Ledesma, Universidad de Alicante, Spain

17:30-17:50
A Control Strategy for Two-level Systems with Optimization in the Feedback Loop 1465
A. V. Pagalos, G.S. Stavropoulos, P.P. Groumpos, University of Patras, Greece

17:50-18:00 - Brief Paper
Repetitive Control Systems Theory Applied to Mining Systems 1471
E. Rogers, University of Southampton, UK
D.H. Owens, University of Exeter, UK

18:00-18:10 - Brief Paper
Evaporator Control Design: A Quantitative Feedback Theory Approach 1473
R. Kundergj, P.S.V. Nataraj, Indian Institute of Technology, Bombay, India

18:10-18:20 - Brief Paper
On the Control of Scanning Tunnelling Microscopes 1475
R. Banning, P.M.L.O. Schötte, A.E. Holman, Delft University of Technology, The Netherlands

FRIDAY MORNING
26th August, 1994
### Session FM-1
**Room:** SGBSI Level 3 - MULL
**Manufacturing Systems I**

**Chairperson:** J.R. Leigh, University of Westminster, London, UK
**Co-Chairperson:** L. Ylinden, University of Technology, Helsinki, Finland

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00-10:20</td>
<td>Real Time Robotic Assembling of Moving Pieces by Visual Sensor</td>
<td>F. Leonard, Lab. de Mecatronique Industrielle, ENI de Metz, France; G. Abba, E. Ostertag, Y. Dossmanh, Groupe de Recherche d'Automatique et d'Informatique Industrielle, Strasbourg, France</td>
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<tr>
<td>10:20-10:40</td>
<td>Position Motion Control of Workpiece Steadies for Compensation in the Traverse Grinding Process</td>
<td>Y. Gao, B. Jones, University of Birmingham, UK</td>
</tr>
<tr>
<td>10:40-11:00</td>
<td>A Dynamic Flow Control Policy of Failure Prone Flexible Manufacturing Systems</td>
<td>J. Long, Universite de Saint Etienne, Roane, France</td>
</tr>
<tr>
<td>11:00-11:20</td>
<td>A Versatile Visual Inspection Tool for the Manufacturing Process</td>
<td>P. Liatsis, P.E. Wellstead, M.B. Zarrop, Control Systems Centre UMIST, Manchester, UK; T. Prendergast, British Aerospace, Preston, UK</td>
</tr>
<tr>
<td>11:20-11:40</td>
<td>A New Solution to Design Polyvalent Grippers Systems for Industrial Applications</td>
<td>P. Gorce, PSA Peugeot-Citroen, Biévres, France; C. Villard, J.G. Fontaine, P. Coiffet, J. Rabit, Laboratoire de Robotique de Paris, Velizy Villacoublay, France</td>
</tr>
<tr>
<td>11:40-12:00</td>
<td>Input Shapers for Improving the Throughput of Torque-Limited Systems</td>
<td>W. Singhose, S. Derezinski, N. Singer, Convolve Inc., Armonk, USA</td>
</tr>
</tbody>
</table>

### Session FM-2 (invited)
**Room:** K3.17 - SKYE
**Steel Industry**

**Organizer:** G. van Ditzhuijzen, Hoogovens Technical Services, Ijmuiden, The Netherlands
**Chairperson:** G. van Ditzhuijzen, Hoogovens Technical Services, Ijmuiden, The Netherlands
**Co-Chairperson:** A. Zanini, Siderca SAIC, Buenos Aires, Argentina

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00-10:20</td>
<td>Development of a Strip Temperature Control System with Adaptive Generalized Predictive Control</td>
<td>A. Hasegawa, Nippon Steel Corp., Futsu, Japan</td>
</tr>
<tr>
<td>10:20-10:40</td>
<td>An Application of Advanced Control to Steel Casting...</td>
<td>S.F. Graebe, G.C. Goodwin, M.R. West, P. Stepien, University of Newcastle, Australia</td>
</tr>
<tr>
<td>10:40-11:00</td>
<td>Application of Kalman Filtering to Zinc Coating Mass Estimation</td>
<td>G.C. Goodwin, University of Newcastle, Australia; S.J. Lee, Chungham National University, Korea; A. Carlton, G. Wallace, Industrial Automation Services Pty. Ltd., Toronto, Australia</td>
</tr>
<tr>
<td>11:20-11:40</td>
<td>Gauge Control in Tandem Cold Rolling Mills: A Multivariable Case Study Using H Optimization</td>
<td>I. Postlethwaite, E.J.M. Geddes, University of Leicester, UK</td>
</tr>
<tr>
<td>11:40-12:00</td>
<td>MIMO System Identification of a Slab Reheating Furnace</td>
<td>A. Kusters, G. van Ditzhuijzen, Hoogovens Technical Services, Ijmuiden, The Netherlands</td>
</tr>
</tbody>
</table>
Session FM-3
Room: K3.27 - RAASAY
Robust Control

Chairperson: A. H. Haddad, Northwestern University, Evanston, USA
Co-Chairperson: G. C. Goodwin, University of Newcastle, Australia

10:00-10:20
Robust Control System Design for Plants with Recycle
O. Taiwo, Obafemi Awolowo University, Ile Ife, Nigeria
V. Krebs, Universität Karlsruhe, Germany

10:20-10:40
Robust Control Using GA-Optimized Neural Networks
K. Krishna Kumar, E. Smuda, University of Alabama, Tuscaloosa, USA

10:40-11:00
Design of a Robust Controller for a Grinding System
H. E. Jenkins, T. R. Kurfess, Carnegie Mellon University, Pittsburgh, USA
R. C. Dorf, University of California, Davis, USA

11:00-11:20
Estimated Frequency Domain Model Uncertainties Used in Robust Controller Design - A -Approach
S. Toffner-Clausen, P. Andersen, P. Kristensen, Aalborg University, Denmark
J. Stoustrup, H.H. Niemann, Technical University of Denmark, Lyngby, Denmark

11:20-11:40
Robust Control Design for a Spaceborn Telescope Guidance System
S. Chemishkian, American University of Armenia, Yerevan, Armenia
E. Meroyan, State Engineering University, Yerevan, Armenia

11:40-12:00 - Brief Paper
Robust Pole Assignment for Interval Systems Using Output Feedback
O. Ismail, University of Aleppo, Syria
B. Bandypadhyay, Indian Institute of Technology, Bombay, India

Session FM-4
Room: K3.14 - IONA
HVAC-Systems I

Chairperson: J.E. Rijnsdorp, Twente University of Technology, The Netherlands
Co-Chairperson: V. Bobal, Technical University Brno, Czech Republic

10:00-10:20
Optimal Adaptive Predictive Control and Fault Detection of Residential Building Heating Systems
C. Georgescu, A. Afshari, Schlumberger Montrouge Research, Montrouge, France
G. Bornard, Laboratoire d'Automatique de Grenoble, Saint Martin d'Hères, France

10:20-10:40
Fuzzy Control for Temperature and Humidity in Refrigeration Systems
M. Becker, D. Oestreicht, H. Hasse, L. Litz, Universität Kaiserslautern, Germany

10:40-11:00
Neural Approximation for the Optimal Control of Heating Systems
A. Alessandri, T. Parisini, DIST-University of Genoa, Italy
F. B. Verona, A. Torrini, DSEA-University of Pisa, Italy

11:00-11:20
Fuzzy Logic Control and Weather Forecast for Energy-Efficient Potato Storage
J. Pulaczewski, Technical University of Warsaw, Poland
E. Wachowicz, Engineering High School in Koszalin, Poland

11:20-11:40
Output Envelope Adjustment for an Environment Fuzzy Logic Controller
J.T. Cooper, K. Warwick, University of Reading, UK

11:40-12:00
"Intelligent" Fuzzy Regulation of Residential Buildings
P.F. MacConnell, D.H. Owens, University of Exeter, UK

Session FM-5
Room: SGBS:Level 4 - RHUM
Predictive Control I

Organizer: D. W. Clarke, Oxford University, UK
Chairperson: D. W. Clarke, Oxford University, UK
Co-Chairperson: A. G. Kuznetsov, Oxford University, UK
10:00-10:20
Application of Stabilizing Predictive Control to Boilers ................................................. 1637
T.J. Manayathara, J. Bentsman, G. Pellegrinetti, R. Blauwkamp, University of Illinois at Urbana-Champaign, USA

10:20-10:40
Industrial Applications of Predictive Functional Control to Rolling Mill, Fast Robot, River Dam .......... 1643
J.M. Compas, P. Decarreau, G. Lanquetin, J.L. Estival, N. Fuglet, R. Martin, J. Richalet, ADERSA, Verrieres-le-Buisson, France

10:40-11:00
Application of Generalized Predictive Control to a Solar Power Plant ...................................... 1657
E. Camacho, M. Berenguel, Universidad de Seville, Spain

11:00-11:20
New Predictive Techniques: Control Axis Solutions ...... 1663
D. Dumar, P. Boucher, SUPELEC, Gif-Sur-Yvette, France

11:20-11:40
Generalised Predictive Control with Prespecified Set-Points in Clinical Anaesthesia ..................... 1669
D.A. Linkens, M. Mahouf, University of Sheffield, UK

11:40-12:00
Application of Multivariable Generalized Predictive Control to the Simulink Model of a Paper Machine ...... 1675
C.-M. Chow, A.G. Kuznetsov, D.W. Clarke, Oxford University, UK

10:20-10:40
Optimization of Investment in Educational Campaigns in the Control of Insect Transmitted Diseases .......... 1689
J.A.M.F. de Souza, Universidade da Beira Interior, Covilha, Portugal
T. Yoneyama, Instituto Tecnológi de Aeronáutica, São José dos Campos, Brazil

10:40-11:00
Nonlinear Biomathematical Models with State-dependent Delays ................................................. 1695
B. Tibken, E.P. Hofer, S. Hofmann, University of Ulm, Germany

11:00-11:20
A Hybrid Controller Combining Model- and Knowledge-Based Methods Applied to a Bioprocess .......... 1695
U. Schaffranietz, TU Berlin, Germany
H. Röck, Christian-Albrechts-University Kiel, Germany

11:20-11:30 - Brief Paper
On The Application of Bifurcation Theory to Nonlinear Modelling ............................................ 1701
I.A. Njabeleke, P.K. Bhattacharrya, J.R. Leigh, University of Westminster, London, UK

Session FM-6
Room: SGBS5.05 - UIST
Biomedical/Biochemical Processes

Chairperson: E.P. Hofer, University of Ulm, Germany
Co-Chairperson: J. E. S. de Cursi, INSA de Rouen, Mont Saint Aignan, France

10:00-10:20
On Structure Identification of Parallel Weiner-Hammerstein Models .................................................. 1705

10:20-10:40
A New Bias-compensating Least-squares Method for Continuous-time MIMO System Identification Applied to a Laboratory-scale Process ......................................................... 1711
H. Garnier, P. Sibille, H.L. Nguyen, Centre de Recherche en Automatique de Nancy, Vandoeuvre, France

10:40-11:00
Monitoring Parameter Identifiability During On-Line Identification .............................................. 1717
S. Niu, D.G. Fisher, University of Alberta, Edmonton, Canada
11:00-11:20
Self Learning Fuzzy Models Using Stochastic Approximation.................................1723
K. Küpper, University of Duisburg, Germany

11:20-11:40
Application of Modified Sigma-Pi-linked Neural Network to Dynamical System Identification..................1729
T.W.S. Chow, G. Fei, Y.F. Yam, City Polytechnic of Hong Kong, Hong Kong

11:40-11:50 - Brief Paper
Inertia Parameter Identification of Rigid Bodies Using A Multi-Axis Test Facility..............................1735
H. Hahn, K.-D. Leimbach, A. Piepenbrink, University of Kassel, Germany

11:50-12:00 - Brief Paper
Verifying Finite Element Assumptions using Structural System Identification ........................................1739
M.T. Jonsson, T.P. Runarsson, University of Iceland, Reykjavik, Iceland

11:00-11:10
A Modified Iterative Method for Optimal Flow Control in Flexible Manufacturing Systems......................1769
E. Khmelnitsky, K. Kogan, O. Maimon, Tel-Aviv University, Israel

Session FA-2
Room: K3.17 - SKYE
Steel Industry and Thermal Systems

Chairperson: S. Kotob, Kuwait Institute for Scientific Research, Safat, Kuwait
Co-Chairperson: A. Zanini, Siderca SAIC, Buenos Aires, Argentina

13:30-13:50
Disturbance Rejection Dead-Time Controller ..................1777
A.M.P. Ferreira, Alcan Rolled Products Company, Fairmont, USA

13:50-14:10
Process Control of a Laboratory Plant for Direct Casting of Thin Steel Strips .................................1783
S. Bernhard, H. Rake, RWTH Aachen, Germany

14:10-14:30
Robust Control of a Sendzimir Mill ............................1789
S.O.R. Mohermani, I.R. Petersen, Australian Defense Force Academy, Campbell, Australia
D. Stirling, BHP Sheet and Coil Products Division, Port Kembla, Australia
D. C. McFarlane, BHP Research - Melbourne Laboratories, Clayton, Australia

14:30-14:50
Modeling & Control of a Thermal System ......................1795
D. Mehdi, L.A.I.I./E.S.I.P., Poitiers, France

14:50-15:10
Modelling and Dynamic Feedback Linearisation of a Heat Exchanger Model .................................1801
M.H.R. Fazlur Rahman, R. Devanathan, Nanyang Technological University, Singapore

Session FA-3
Room: K3.27 - RAASAY
Modelling Tools and Signal Detection/Prediction

Chairperson: N. Munro, University of Manchester, UK
Co-Chairperson: A.H. Haddad, Northwestern University, USA
<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:30-13:50</td>
<td>Qualitative Controller for Linear Systems</td>
<td>Y. M. Enab, University of Surrey, Guildford, UK</td>
</tr>
<tr>
<td>13:50-14:10</td>
<td>Representing Piecewise Linear Systems Analysis and Simulation</td>
<td>V. Besson, N.B.O.L. Petit, P.E. Wellstead, UMIST, Manchester, UK</td>
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<td>L.L. Lai, City University, London, UK</td>
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<td>D.M.K. Al-Gobaisi, Water and Electricity Department, Abu Dhabi, UAE</td>
</tr>
<tr>
<td>14:20-14:30</td>
<td>Brief Paper: Input Observers Through Singular Implicit Models: Application to a Test Case in Marine Seismic Deconvolution</td>
<td>A. Caiti, Saclant Undersea Research Centre, La Spezia, Italy</td>
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<td>G. Cannata, IAN-CNR Naval Automation Institute, Genoa, Italy</td>
</tr>
<tr>
<td>14:30-14:50</td>
<td>Applications of the Singular Perturbation Approximation of Balanced Systems</td>
<td>R. Samar, I. Postlethwaite, D.-W. Gu, University of Leicester, UK</td>
</tr>
<tr>
<td>14:50-15:10</td>
<td>Signal Detection Using a Hybrid System Model</td>
<td>D.M. Krinsky, A.H. Haddad, C.C. Lee, Northwestern University, Evanston, USA</td>
</tr>
<tr>
<td>15:10-15:30</td>
<td>Comparison of Different Methods of Bilinear Time Series Prediction</td>
<td>E.M. Bielinska, I. Nabaglo, Silesian Technical University, Gliwice, Poland</td>
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<td>13:30-13:50</td>
<td>Optimal Indoor Temperature Control with the Use of a Predictor</td>
<td>P.J. Lute, LuTech, Rozenburg, The Netherlands</td>
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<td>A.H.C. van Paassen, Delft University of Technology, The Netherlands</td>
</tr>
<tr>
<td>13:50-14:10</td>
<td>Neural Control of Non-linear HVAC Plant</td>
<td>S.J. Hepworth, A.L. Dexter, University of Oxford, UK</td>
</tr>
<tr>
<td>14:10-14:30</td>
<td>Minimum-Cost Control of HVAC Systems Under Real-time Prices</td>
<td>B. Daryanian, Tabors Caramanis &amp; Associates, Cambridge, USA</td>
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<td>L.K. Norford, Massachusetts Institute of Technology, Cambridge, USA</td>
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<tr>
<td>14:30-14:50</td>
<td>Model-based Control for HVAC Applications</td>
<td>G.S. Virk, Bradford University, UK</td>
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<td>D. Loveday, Loughborough University of Technology, UK</td>
</tr>
<tr>
<td>14:50-15:10</td>
<td>Results of the Application of a Quality Assessment Procedure to Different Building Energy Management Systems</td>
<td>J.C. Visier, H. Vaezi Nejad, M. Jandon, Centre Scientifique et Technique du Bâtiment, Marne la Vallée, France</td>
</tr>
<tr>
<td>15:10-15:30</td>
<td>Preliminary Evaluation of a Qualitative Model-based Fault Detector for a Central Air-handling Unit</td>
<td>A.S. Glass, P. Gruber, M. Roos, J. Todtli, Landis &amp; Gyr AG, Zug, Switzerland</td>
</tr>
</tbody>
</table>

Session FA-4 (invited)
Room: K3.14 - IONA
HVAC-Systems II

Organizer: A.L. Dexter, Oxford University, UK
Chairperson: D. Lush, Ove Arup & Partners, London, UK
Co-Chairperson: A.L. Dexter, Oxford University, UK

13:30-13:50
Feasibility and Stability for Constrained Stable Predictive Control

J. A. Rossiter, Loughborough University, UK
B. Kouvaritakis, J. R. Gossner, University of Oxford, UK
14:30-14:50
Facilitating Control of Fed-batch Fermentation Processes by Monitoring the Growth Rates of Saccharomyces Cerevisiae

14:50-15:10
Flexible Automation of Biotechnological Pilot-plant with Real-time Network

15:10-15:30
Characterization of Optimal Feed Rate Profiles for Fed-batch Fermentation Processes

Session FA-6 (invited)
Room: SGBSS.05 - UIST
Biotechnological Processes

Organizer: C. Posten, GBF National Research Center for Biotechnology, Braunschweig, Germany
Chairperson: C. Posten, GBF National Research Center for Biotechnology, Braunschweig, Germany
Co-Chairperson: N. Thornhill, University College London, UK