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Guidance and Control of Underwater Vehicles (GCUV2003)

IFAC Workshop

Newport, Wales, UK, 9 – 11 April, 2003

The 1st IFAC Workshop on Guidance and Control of Underwater Vehicles – GCUV2003 was held at the University of Wales College, Newport, UK 9–11 April 2003. The aim of the Workshop was to bring together academic practitioners and industrialists involved in this important and expanding area of interest in order to exchange experiences on recent advances in this field.

The Workshop comprised 39 papers and three Plenary Addresses. In the first Plenary Address: Marine robots for ocean exploration; theoretical challenges and practical issues, Antonio Pascoal (Institute Superior Technical, Portugal) presented an excellent, illustrated exposition, on the interplay between theory and practice, key concepts and challenges in navigation, guidance and control of marine robotics, with an emphasis on cooperation with marine scientists. Jas Singh (Systems Engineering & Assessment, UK) presented the second Plenary Address where he outlined the UK Ministry of Defence's new Battlespace Access Unmanned Underwater Vehicles project. The third Plenary Address, presented by Laurie Linnet (Fortkey Ltd., UK), concerned UUV-based innovative vision techniques for information retrieval.

In addition to the three Plenary Addresses, the workshop consisted of eight regular sessions and a multimedia/demonstration session. Topics covered included UUV Control Applications, System Identification, UUV Architectures, Navigation, Modelling, Fault Detection and Reconfiguration. Countries represented by the 65 authors and delegates were: Croatia, Denmark, Italy, Ireland, Japan, Portugal, Spain, Turkey, USA and the UK.

The Workshop was sponsored by the TC on Marine Systems and co-sponsored by the TC on Intelligent Autonomous Vehicles. Local sponsorship came from the Welsh Development Agency (WDA), The Society for Underwater Technology (SUT), The Institute of Marine Engineering, Science and Technology (IMarEST) and the Office of Naval Research (UK Field Office).

An innovative aspect of the Workshop was the new form of presentation, which the organizers called the Multimedia/Demonstration Session. The Multimedia/Demonstration Session provided the opportunity for delegates to present practical results. i.e. video and simulation studies and demonstrations of laboratory-based simulations and laboratory-based UUVs, which could not easily be presented within the confines of a twenty minute regular paper presentation. Nine papers were specially elected for this session and were joined by demonstrations of *Subzero* (Southampton University), *URIS* (University of Girona), *Falcon* (Seaeeye Marine Ltd.) and *Archerfish* (BAe Systems) UUVs.

The IMarEST prize for the best paper by a young author was awarded to James Kinsey (Johns Hopkins University, USA) for his paper with Louis Whitcomb entitled: *Preliminary filed experience with the DVLNAV integrated navigation system for manned and unmanned submersibles*.



James Kinsey

The SUT prize for the best multimedia paper presentation was awarded to Edwin Omerdic (University of Wales, Newport, UK) for his paper with Geoff Roberts entitled: *Thruster fault accommodation and reconfiguration for underwater vehicles*.



Edwin Omerdic

The Workshop was voted a resounding success by all delegates and in the light of this vote of confidence the TC on Marine Systems is planning to run this event again in 2005, with the slightly amended title of Navigation, Guidance and Control of Underwater Vehicles (NGCUV2005). The venue for NGCUV2005 will be decided at the September TC meeting at MCMC'03.

Professor G N Roberts, NOC Chair, University of Wales, Newport, UK. Professor R Sutton, IPC Chair, The University of Plymouth, UK.

**Now Available
Now Available
Now Available**

The Proceedings of the 15th IFAC World Congress, held in Barcelona in July 2002 are now available.

They can be purchased online, at

<http://www.elsevier.com>
<http://www.elsevier.com/inca/publications/store/6/7/2/9/1/3/index.htm>

**CALL FOR NOMINATIONS
FOR
THE HAROLD CHESTNUT
CONTROL ENGINEERING TEXTBOOK PRIZE**

The Harold Chestnut Control Engineering Textbook Prize Selection Committee of the International Federation for Automatic Control (IFAC) calls for nominations for the Triennial Harold Chestnut Control Engineering Textbook Prize.

The Prize is awarded to the author(s) of a control engineering textbook that has contributed most to the education of control engineers.

The Prize, consisting of a monetary award and a certificate, will be presented at the Closing Ceremony of the 16th IFAC World Congress that will be held in Prague in 2005.

Nominations must meet the submission criteria as follows:

1. book to be written in one of the official IFAC languages, preferably in English; and
2. book to be published between September 1, 1996 and July 31, 2002.

Nominations must include:

- a) Nomination letter that states the full title, name(s) and address of the author(s), name of the textbook, date of publication, and name and address of the publisher;
- b) Evidence of the contribution of the textbook to the education of control engineers; and
- c) Any additional information that may support the judging process, such as a book review, a letter of support by the publisher, a list of universities that have adopted the book for teaching purposes, etc.

It is important to note that only those book reviews that have been published by Automatica, Control Engineering Practice or another IFAC affiliated journal within the above mentioned publishing period will be taken into consideration.

If the Prize-winning textbook is written by more than one author, the monetary component of the Prize will be equally split among the authors with each author receiving a certificate.

Please send your nominations to:

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**To be considered, nominations must be received by close of business on
June 30, 2004**

The winner(s) will be notified well in advance to let them plan their attendance at the
Award Ceremony in Prague, 2005.

Your cooperation is greatly appreciated.



Papers from the December 2002 Issue

- An Automated Gantry Crane as a Large Workspace Robot
(Oliver Sawodny, Harald Aschemann and S. Lahres)
- Hybrid Attitude Control in Steering Maneuver Using ARC Hil Setup
(Hyo-Jun Kim and Young-Pil Park)
- Time and Frequency Domain Identification and an Analysis of a Gas Turbine Engine
(O. M. Boaghe, S. A. Billings, L. M. Li, P. J. Fleming and J. Liu)
- A New Pulse Modulation Adaptive Controller (PMAC) Applied to HVAC Systems
(T. I. Salsbury)
- Application of Input Estimation Techniques to Charge Estimation and Control in Automotive Engines
(A. Stotsky and I. Kolmanovsky)
- Input Estimation with Multiple Model for Maneuvering Target Tracking
(Sang Jin Shin and Taek Lyul Song)

Papers from the January 2003 Issue

- Nonlinear Adaptive Control of Master-slave System in Teleoperation
(N. V. Q. Hung, T. Narikiyo and H. D. Tuan)
- Fuzzy Logic Based Full-envelope Autonomous Flight Control for an Atmospheric Re-entry Spacecraft
(S.-F. Wu, C. J. H. Engelen, R. Babuska, Q.-P. Chu and J. A. Mulder)
- Design of a Supervised Control System for a Sludge Dewatering Process
(C. Aubrun, P. De Cuyper and D. Sauter)

Special Section on Automation in Mining, Mineral and Metal Processing

- (Mituhiko Araki)
- Multi-sensor Identification and Sorting of Bulk Solids
(H. U. R. Kattentidt, T. P. R. de Jong and W. L. Dalmijn)
- Foam Level Control in a Water Model of the LD Converter Process
(W. Birk, I. Arvanitidis, A. Medvedev and P. Jonsson)
- Experimental Design for the Economic Performance Evaluation of Industrial Controllers
(I. K. Craig and I. Koch)
- Flotation Column Automation: State of the Art
(L. G. Bergh and J. B. Yianatos)
- Control of Pulp Levels in Flotation Cells
(S.-L. Jämsä-Jounela, M. Dietrich, K. Halmevaara and O. Tiili)
- A Process Monitoring System Based on the Kohonen Self-organizing Maps
(S.-L. Jämsä-Jounela, M. Vermasvuori, P. Enden and S. Haavisto)
- CFD Modelling for Control of Hazardous Waste Incinerator
(Yongxiang Yang, Markus A. Reuter and Derk T. M. Hartman)
- Linear and Bilinear Fault Detection and Diagnosis Based on Mass and Energy Balance Equations
(A. Berton and D. Hodouin)

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- Gain-scheduled Control of an Electrostatic Levitator
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- Off-line Feed-forward and Feedback Control on a Vibration Rig
(J. De Cuyper, M. Verhaegen and J. Swevers)
- A practical multiple model adaptive strategy for single-loop MPC
(D. Dougherty and D. Cooper)

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- (G. L. Gissinger)
- A Mechatronic Conception of a New Intelligent Braking System
(G. L. Gissinger, C. Menard and A. Constans)
- Energy Management Strategies for Parallel Hybrid Vehicles Using Fuzzy Logic
(N. J. Schouten, M. A. Salman and N. A. Kheir)
- Modelling and Simulation for Mechatronic Design in Automotive Systems
(T. Bertram, F. Bekes, R. Greul, O. Hanke, C. Haß, J. Hilgert, M. Hiller, O. Ottgen, P. Oppen-Rhein, M. Torlo and D. Ward)
- Mechatronics and Drive-by-wire Systems
Advanced Non-contacting Position Sensors
(H. T. Dorissen and K. Durkopp)
- Full Vehicle ABS Braking Using the SWIFT Rigid Ring Tyre Model
(J. P. Pauwelussen, L. Gootjes, C. Schroder, K. U. Kohne, S. Jansen and A. Schmeitz)
- Modeling of Rollover Sequences
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- Driver-aid System Using Path-planning for Lateral Vehicle Control
(J. Ph. Lauffenburger, M. Basset, F. Cof)

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(Ting-Yung Lin, Yih-Chieh Pan and Chen Hsieh)
- System Identification with Generalized Orthonormal Basis Functions: An Application to Flexible Structures
(V. Nalbantolu, J. Bokor, G. Balas and P. Gaspar)
- A Data Driven Subspace Approach to Predictive Controller Design
(R. Kadali, B. Huang and A. Rossiter)
- Inverse-NARMA: A Robust Control Method Applied to SI Engine Idle-Speed Regulation
(A. P. Petridis and A. T. Shenton)
- Closed-loop Identification of an Industrial Robot Containing Flexibilities
(M. Ostring, S. Gunnarsson and M. Norrlof)

Preface to the Special Section on Advances in Automotive Control

- (U. Kiencke and G. L. Gissinger)
- An Adaptive Estimator of Fuel Film Dynamics in the Intake Port of a Spark Ignition Engine
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(H. Straky, M. Kochem, J. Schmitt and R. Isermann)
- Vehicle Chassis Monitoring System
(P. Pisu, A. Soliman and G. Rizzoni)

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- Analysis of Power and Frequency Control Requirements in View of Increased Decentralized Production and Market Liberalization
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- Indirect Adaptive Dual Control for Hammerstein Systems Using ANN
(T. Knohl, W. M. Xu and H. Unbehauen)
- Closed-loop Congestion Control in a GEO Satellite System
(F. Delli Priscoli and A. Pietrabissa)
- Vehicle Longitudinal Brake Control Using Variable Parameter Sliding Control
(Hong Liang, Kil To Chong, Tae Soo No and Soo-Young Yi)

Special section on Manoeuvring Control of Marine Craft

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- Cheap Diagnosis Using Structural Modelling and Fuzzy-logic-based Detection
(R. Izadi-Zamanabadi, M. Blanke and S. Katebi)

- The Effect of Roll-stabilisation Controllers on Warship Operational Performance
(P. Crossland)
- Adaptive Fuzzy Ship Autopilot for Track-keeping
(J. Velagic, Z. Vukic and E. Omerdic)
- A Fuzzy Approach to Redundancy Resolution for Underwater Vehicle-manipulator Systems
(G. Antonelli and S. Chiaverini)
- Remotely Operated Vehicle Depth Control
(S. M. Zanoli and G. Conte)
- Bottom-following for Remotely Operated Vehicles
(M. Caccia, R. Bono, G. Bruzzone and G. Veruggio)
- Designing a Fuzzy-like PD Controller for an Underwater Robot
(I. S. Akkizidis, G. N. Roberts, P. Ridao and J. Battle)

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- System Analysis via Performance Maps
(J. J. Alpigini and D. W. Russell)
- Optimal Climate Control of a Storage Facility Using Local Weather Forecasts
(K. J. Keesman, D. Peters and L. J. S. Lukasse)
- Modeling and Control of an Industrial Pressure Screen
(M. Khanbaghi, B. Allison and J. Olson)
- Lateral Control of a Backward Driven Front-steering Vehicle
(R. Rajamani, C. Zhu and L. Alexander)

Special Section on Automatic Control in Aerospace

- (G. Bertoni)
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(J. F. Wagner and T. Wieneke)
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- Dynamics and Flight Support of a Vehicle Ikar Control System at Orbiting Globalstar Satellites
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- A Practical Multiple Model Adaptive Strategy for Multivariable Model Predictive Control
(D. Dougherty and D. Cooper)
- Optimal Operation of Fed-batch Fermentations via Adaptive Control of Overflow Metabolite
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(T. Kawabe)
- RD-CNN for Driving a 2-D Conveyor Belt via Memory Shape Alloys
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(J.-X. Xu)
Time Series Analysis by State Space Models, by
J. Durbin and S.J. Koopman
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(D. Jeltsema, J.M.A. Scherpen)

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A Mixed H_2/H_∞ -infinite Adaptive Tracking
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Open-loop Worst-case Identification of
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(Y.B. Shtessel, A.S.I. Zinober, I.A. Shkolnikov)
Synthesis of H-infinite PID Controllers:
A Parametric Approach
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A New Separation Result for a Class of
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(G. Besancon, S. Battilotti, L. Lanari)

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Attenuation and Application to Robust Fault
Detection
(G. Besancon)
Pole Placement with Sensitivity Function
Shaping Using 2nd Order Digital Notch Filters
(H. Prochazka, I.D. Landau)

Correspondence

Robust Stabilization of Uncertain Time-varying
Discrete Systems and Comments on “An
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Predictive Control”
(W. J. Mao)

Book Reviews

Coding Approaches to Fault Tolerance in
Combinational and Dynamic Systems, by
Christoforos N. Hadjicostis
(S. Simani)

WHO IS WHO IN IFAC



J.M. Dion – IFAC Council Member

Jean-Michel Dion was born in 1950 in La Tronche, France. He received the PhD degree from the National Polytechnic Institute of Grenoble (INPG), France in 1977. From 1977 to 1979 he was a visiting professor at the National Polytechnic Institute of Mexico City. Since 1979 he has been a researcher at the French National Center for Scientific Research (CNRS). He was director of the Laboratoire d'Automatique de Grenoble and vice president of the National Polytechnic Institute of Grenoble. He is currently director of a federative research institute (ELESA) involving 500 researchers in the fields of microelectronics, signal processing, electrical engineering, control and telecommunications and is director of the department Physics and Engineering Sciences at the French Ministry of Research.

Jean-Michel Dion has published more than 80 international journal papers and 150 international conference papers. His main research interests are in the fields of linear system theory, adaptive control, robust control, and time delay systems with application to electromechanical systems.

Jean-Michel Dion was associate editor of *Automatica*. He was chairman of the IFAC technical committee Linear Systems, he is now member of the IFAC Council.

Fuzzy Control, by K. M. Passino and S. Yurkovich
(D. Liu, H. Zhang)
Predictive Control with Constraints, by J.M. Maciejowski
(E.F. Camacho)
 L_2 -gain and Passivity Techniques in Nonlinear Control, by Arjan van der Schaft
(M. Arcak)
Mobile Robot Localization and Map Building: A Multisensor Fusion Approach, by Jose A. Castellanos and Juan D. Tardos
(T. Bailey, H. Durrant-Whyte)
Analytic Feedback System Design: An Interpolation Approach, by Peter Dorato
(A. Emami-Naeini)

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FORTHCOMING EVENTS

2003
No. 3
June

| Title | 2003 | Place | Further Information |
|--|--|----------------------------------|---|
| American Control Conference – in co-operation with IFAC – | June 4 – 6 | Denver CO, USA | http://acc2003.me.berkeley.edu/ e-mail: bequeb@rpi.edu |
| IFAC Symposium 5 th Fault Detection, Supervision and Safety of Technical Processes – SAFEPROCESS | June 9 – 11 | Washington DC, USA | http://safeproc.gmu.edu e-mail: jgertler@gmu.edu |
| IFAC Symposium Power Plants and Power Systems 2003 | June 9 – 11 POSTPONED New date to be confirmed! | Seoul Korea | http://ifacpps2003.org e-mail: ifacpps2003@insession.co.kr |
| IFAC Symposium 6 th Advances in Control Education – ACE 2003 | June 16 – 18 | Oulu Finland | http://ntsat.oulu.fi e-mail: office@atu.fi |
| IFAC Conference Analysis and Design of Hybrid Systems – ADHS03 | June 16 – 18 | St. Malo France | http://www.supelec-rennes.fr/adhs03/ e-mail: adhs03@supélec-rennes.fr |
| IFAC Symposium Advanced Control of Chemical Processes – ADCHEM 2003 | June 18 – 20 NEW DATE! (postponed to January 11 – 14, 2004) | Hong Kong China | http://www.ust.hk/adchem2003 http://www.adchem2003.uni-stuttgart.de/ e-mail: adchem2003@ist.uni-stuttgart.de |
| XVII IMEKO WORLD CONGRESS <i>Metrology in the 3rd Millennium</i> | June 22 – 27 | Dubrovnik Croatia | http://www.imeko.org e-mail: imeko2003@hmd.hr |
| IFAC Symposium 4 th Robust Control Design – ROCOND 2003 | June 25 – 27 | Milan Italy | http://www.elet.polimi.it/ROCOND2003 e-mail: colaneri@elet.polimi.it |
| IFAC Workshop Automatic Systems for Building the Infrastructure in Developing Countries (Knowledge and Technology Transfer) | June 27 – 28 | Istanbul Turkey | http://www.dogus.edu.tr/decom03 e-mail: decom03ifac@dogus.edu.tr |
| IFAC Workshop 12 th Control Applications of Optimization – CAO | June 30 July 2 | Visegrad Hungary | http://www.conferences.hu/CAO2003/ e-mail: bars@aut.bme.hu |
| IFAC Workshop Technology and International Stability | July 3 – 5 | Waterford Rep. of Ireland | http://www.ihr.tuwien.ac.at/swiis03 e-mail: swiis@ihr.tuwien.ac.at |
| IFAC Conference Fieldbus Systems and their Applications – FeT2003 | July 7 – 8 | Aveiro Portugal | http://www.det.ua.pt/eventos/fet2003 e-mail: fet2003@det.ua.pt |
| IFAC Symposium Intelligent Components and Instruments for Control Applications – SICICA 2003 | July 9 – 11 | Aveiro Portugal | http://www.det.ua.pt/eventos/sicica2003 e-mail: sicica2003@det.ua.pt |
| IFAC Workshop Modelling and Analysis of Logic Controlled Dynamic Systems | July 30 August 1 | Irkutsk Lake Baikal Russia | http://giscenter.icc.ru/ifacbaik/ e-mail: belyaeva@icc.ru |
| IFAC Symposium 10 th Transportation Systems | Aug. 4 – 6 | Tokyo Japan | http://www.is.aist.go.jp/ifac-cts2003 e-mail: tsugawa.s@aist.go.jp |
| IFAC Symposium 5 th Modelling and Control in Biomedical Systems | August 21 – 23 | Melbourne Australia | http://www.tourhosts.com.au/ifac2003 e-mail: ifac2003@tourhosts.com.au |
| IFAC Symposium 13 th System Identification – SYSID 2003 | August 27 – 29 | Rotterdam Netherlands | http://sysid2003.nl e-mail: info@sysid2003.nl |
| IFAC Symposium 7 th Robot Control – SYROCO 2003 | September 1 – 3 | Wroclaw Poland | http://www.zpcir.ict.pwr.wroc.pl/syroco2003 e-mail: tchon@ict.pwr.wroc.pl |
| European Control Conference (in co-operation with IFAC) | September 1 – 4 | Cambridge UK | http://conferences.iee.org/ECC03/ e-mail: jmm@eng.cam.ac.uk |
| IFAC Conference Control Systems Design | September 7 – 10 | Bratislava Slovakia | http://www.kasr.elf.stuba.sk/csd2003 e-mail: csd2003@kasr.elf.stuba.sk |
| IFAC Workshop Time Delay Systems | September 8 – 10 | Rocquencourt France | http://www.inria.fr/tds03.html e-mail: tds03@inria.fr |
| IFAC Conference 6 th Manoeuvring and Control of Marine Systems – MCMC 2003 | September 17 – 19 | Girona Spain | http://iia.udg.es/mcmc03 e-mail: mcmc03@iia.udg.es |
| IFAC Symposium 8 th Automated Systems Based on Human Skill – joint design of technology and organization | September 22 – 24 | Gothenburg Sweden | http://www.davinci.chalmers.se/Ifac_2003 e-mail: johan.stahre@hfe.chalmers.se |
| EWICS/IFAC/IFIP Intl. Conference Computer Safety, Reliability and Security – SAFECOMP 2003 | September 23 – 26 | Edinburgh UK | http://www.safecomp.org e-mail: info@safecomp.org |
| IFAC Workshop Intelligent Assembly and Disassembly | October 9 – 11 | Bucharest Romania | http://www.iad2003.com e-mail: iad03@icar.pub.ro |
| IFAC Workshop New Technologies for Automation of the Metallurgical Industry | October 11 – 13 | Shanghai China | http://www.baosight.com/ifac03 e-mail: wangwei@dlut.edu.cn |
| EPS/IFAC/AAPS Int. Conference Accelerator and Large Experimental Physics Control Systems – ICALEPCS 2003 | October 13 – 17 | Gyeongju Korea | http://icalepcs2003.postech.ac.kr/ e-mail: icalepcs2003@icalepcs2003.postech.ac.k |

FORTHCOMING EVENTS (ctd.)

| Title | 2004 | Place | Further Information |
|---|---|--------------------------|---|
| IFAC Symposium Advanced Control of Chemical Processes – ADCHEM 2003 | January 11 – 14 NEW DATE! (postponed from June 18 – 20, 2003) | Hong Kong China | http://www.ust.hk/adchem2003 http://www.adchem2003.uni-stuttgart.de/ e-mail: adchem2003@ist.uni-stuttgart.de |
| IFAC/(CIGR) Workshop 5 th Artificial Intelligence in Agriculture | March 8 – 10 | Cairo Egypt | http://www.claes.sci.eg/aia04 e-mail: soliman@mail.claes.sci.eg |
| IFAC Symposium Computer Applications in Biotechnology | March 28 – 31 | Nancy France | http://www.ensic.inpl-nancy.fr/CAB9/ e-mail: cab9@ensic.inpl-nancy.fr |
| IFAC Symposium 11 th Information Control Problems in Manufacturing – INCOM 2004 | April 5 – 7 | Salvador Brazil | http://www.eletr.ufrgs.br/incom2004/ e-mail: cpereira@eletr.ufrgs.br |
| IFAC Symposium Advances in Automotive Control | April 19 – 23 | Salerno Italy | http://www.ifac04.unisa.it e-mail: ifac04@unisa.it |
| IFAC Symposium Cost Oriented Automation | June 7 – 9 | Gatineau Canada | http://www.tu-berlin.de/~metel/ifac-lca/ e-mail: heinz.erbe@tu-berlin.de |
| IFAC Symposium Automatic Control in Aerospace | June 14 – 18 | St. Petersburg Russia | http://aca2004.aanet.ru e-mail: aca2004@aanet.ru |
| IFAC Symposium Telematics Applications in Automation and Robotics – TA 2004 | June 21 – 23 | Helsinki Finland | http://www.automaatioseura.fi/TA04 e-mail: office@atu.fi |
| American Control Conference – in co-operation with IFAC – | June 30 July 2 | Boston MA, USA | http://www.mie.uiuc.edu/acc2004/index.asp e-mail: speyer@seas.ucla.edu |
| IFAC Symposium Intelligent Autonomous Vehicles – IAV 2004 | July 5 – 7 | Lisbon Portugal | http://iav04.isr.ist.utl.pt e-mail: iav04@isr.ist.utl.pt |
| IFAC Symposium Dynamics and Control of Process Systems – DYCOPS-7 | July 5 – 7 | Cambridge MA, USA | http://notyetavailable e-mail: not yet available |
| IFAC Conference Control Applications in Marine Systems – CAMS 2004 | July 7 – 9 | Ancona Italy | http://cams04.unian.it e-mail: cams04@unian.it |
| IFAC Workshop Fractional Differentiation and its Applications – FDA '04 | July 19 – 20 | Bordeaux France | http://www.lap.u-bordeaux.fr/fda04/home.html e-mail: fda04@lap.u-bordeaux.fr |
| Aşian Control Conference (5th) – in co-operation with IFAC – | July 20 – 23 | Melbourne Australia | http://ascc2004.ee.mu.oz.au e-mail: ascc@ee.mu.oz.au |
| IFAC Symposium Large Scale Systems: Theory and Applications | July 26 – 28 | Osaka Japan | http://www-watt.mech.eng.osaka-u.ac.jp/lss04/ e-mail: ifac-lss04@watt.mech.eng.osaka-u.ac.jp |
| IFAC Symposium Modeling and Control of Economic Systems | July 28 – 31 | Redlands CA, USA | http://newton.uor.edu/facultyfolder/mahmoud_kaboudan/sme_2004/ e-mail: not yet available |
| IFAC Workshops on – Adaptation and Learning in Control and Signal Processing – ALCOSP – Periodic Control Systems – PSYCO | August 30 – September 1 | Yokohama Japan | http://www.contr.sd.keio.ac.jp/ifacws04/main.htm e-mail: katayama@amp.i.kyoto-u.ac.jp e-mail: sano@sd.keio.ac.jp |
| IFAC Symposium 6 th Nonlinear Control Systems – NOLCOS'04 | September 1 – 3 | Stuttgart Germany | http://www.nolcos2004.uni-stuttgart.de e-mail: nolcos2004@ist.uni-stuttgart.de |
| IFAC Multitrack Conference Advanced Control Strategies for Social and Economic Systems | September 2 – 4 | Vienna Austria | http://www.ihr.tuwien.ac.at/acs04 e-mail: kopacek@ihr.tuwien.ac.at |
| IFAC Symposium Mechatronic Systems | September 6 – 8 | Sydney Australia | http://rumi.newcastle.edu.au/mech2004/ e-mail: mechatronics2004@ee.newcastle.edu.au |
| IFAC Workshop 5th Time Delay Systems | September 6 – 8 | Leuven Belgium | http://notyetavailable e-mail: wim.michels@cs.kuleuven.ac.be |
| IFAC Symposium 11 th Automation in Mining, Mineral and Metal Processing – MMM 2004 | September 8 – 10 | Nancy France | http://www.cran.uhp-nancy.fr/ifac-mmm2004/ e-mail: mmm2004@cran.uhp-nancy.fr |
| IFAC Workshop 2 nd Advanced Fuzzy/Neural Control | September 16 – 17 | Oulu Finland | http://www.ntsat.oulu.fi/ e-mail: office@atu.fi |
| IFAC Workshop Discrete Event Systems | September 22 – 24 | Reims France | http://www.univ-reims.fr/wodes04 e-mail: wodes04@univ-reims.fr |
| IFAC Symposium System Structure and Control | December 8 – 10 | Oaxaca Mexico | http://sssc04.cinvestav.mx e-mail: jtorres@cinvestav.mx |
| Title | 2005 | Place | Further Information |
| American Control Conference – in co-operation with IFAC – | June 8 – 10 | Portland OR, USA | http://notyetavailable e-mail: SJayasuriya@mengr.tamu.edu |
| 16TH IFAC WORLD CONGRESS | JULY 4 – 8 | PRAGUE CZ | http://www.ifac.cz |