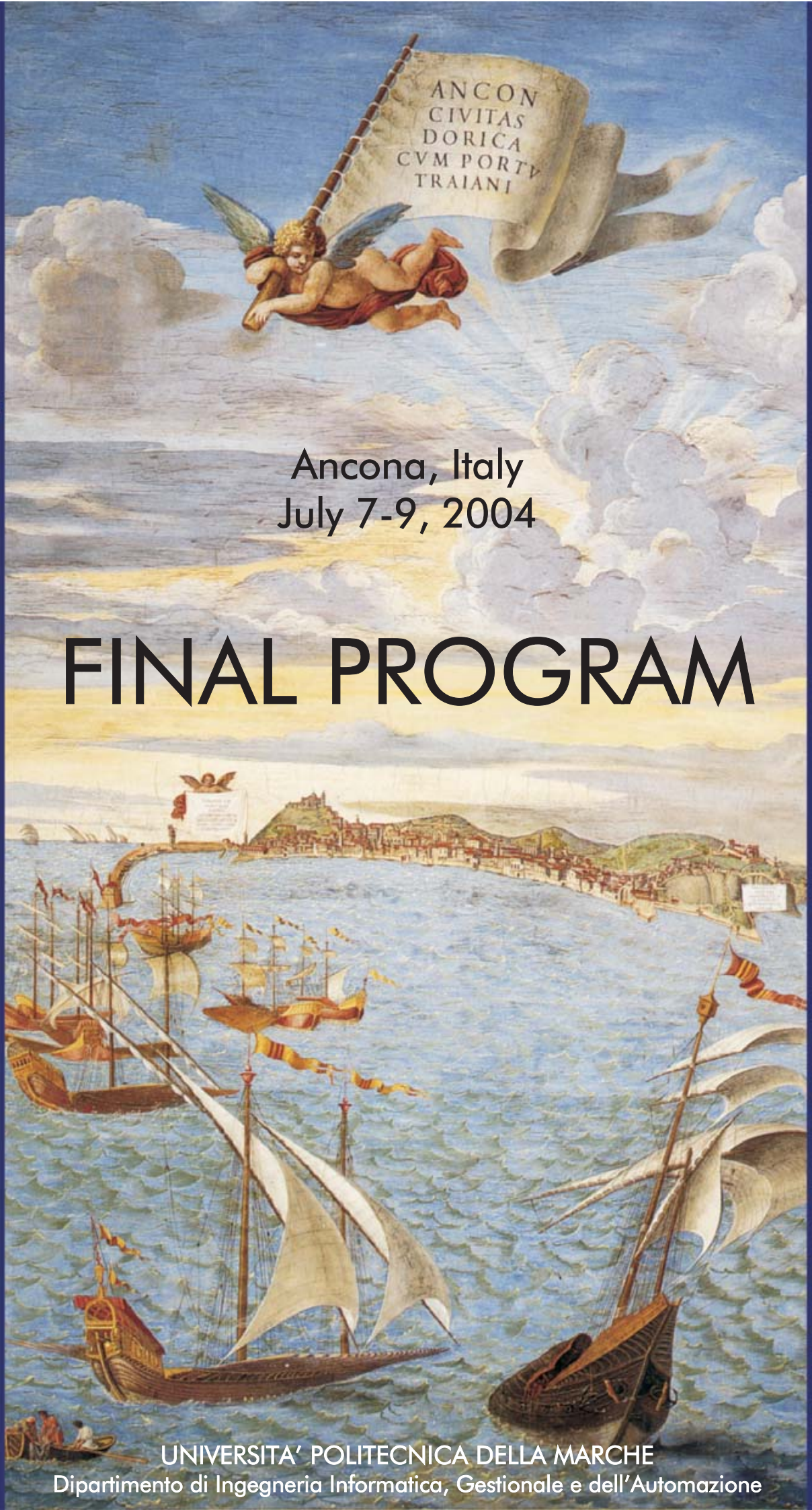
INTERNATIONAL FEDERATION OF AUTOMATIC CONTROL

IFAC



Ancona, Italy
July 7-9, 2004

FINAL PROGRAM

UNIVERSITA' POLITECNICA DELLA MARCHE
Dipartimento di Ingegneria Informatica, Gestionale e dell'Automazione

IFAC Conference on

CONTROL APPLICATIONS IN MARINE SYSTEMS

IFAC Conference on

CONTROL APPLICATIONS IN MARINE SYSTEMS

Ancona, Italy
July 7-9, 2004

QUICK GUIDE

IFAC

Session A: Aula Magna - Session B: Aula 150/1							
Time	**Tuesday 6th July**	**Wednesday 7th July**		**Thursday 8th July**		**Friday 9th July**	
8.45		Welcome					
9.00		**Plenary W1**: A. J. Sørensen		**Plenary T1**: D. Nascetti		**Plenary F1**: E. Zivi	
9.40	Tutorial	**WA1**: Course Planning and Control	**WB1**: Fault Tolerant Control and Fault Detection	**TA1**: Ship Track and Course Keeping	**TB1**: Modelling and Identification of AUV's, Part A	**FA1**: Pose and Motion Estimation of AUV's	**FB1**: Control of Thrusters and Propulsion Systems
10.40		*Coffee*		*Coffee*		*Coffee*	
11.10	Tutorial	**WA2**: Roll Motion Control, part A	**WB2**: Off-shore Systems Modelling and Control	**TA2**: Ship Intelligent Control	**TB2**: Robust Control of Underwater Vehicles	**FA2**: Intelligent and Hybrid Control of Underwater Vehicles	**FB2**: Cooperative Marine Systems
12.50		*Lunch*		*Lunch*		*Lunch*	
14.00	Tutorial	**Plenary W2**: R. Stephens		**Plenary T2**: K. Hasegawa		**Plenary F2**: E. Bovio	
14.40	Tutorial	**WA3**: Roll Motion Control, part B	**WB3**: ICT for Ships	**TA3**: High Speed Vessels	**TB3**: Modelling and Identification of AUV's, Part B	**FA3**: AUV Mission Planning and Control	**FB3**: Devices and Simulation Tools for Marine Systems
						Closing session (15:40)	
15.40		*Coffee*		*Coffee* (16:00)		*Coffee* (16:00)	
16.10	Welcoming (16:30) Reception Registration	**WA4**: Ship Modelling and Control	**WB4**: Control Design for Marine Systems	Technical Visits (16:30)		Technical Visits (16:30)	
17.30 20.00	Welcoming Reception Registration	Technical Visits (17:30)		Conference Banquet (20:00)			

Plenary Lectures: Aula Magna		
Wednesday 7th July	**Thursday 8th July**	**Friday 9th July**
Plenary W1 "Structural Issues in the Design of Marine Control Systems" A. J. Sørensen, *Norwegian University of Science and Technology, Norway*	**Plenary T1** "Italian Navy Trends in Automation of Ship Controls" D. Nascetti, *Italian Navy, Italy*	**Plenary F1** "Design of Robust Shipboard Power Automation Systems" E. Zivi, *U. S. Naval Academy, Annapolis, USA*
Plenary W2 "Aspects of industrial Dynamic Positioning: Reality-tolerant Control" R. Stephens, *ALSTOM Power Conversion, UK*	**Plenary T2** "Some Recent Next Generation's Marine Traffic Systems" K. Hasegawa, *Osaka University, Japan*	**Plenary F2** "Autonomous Underwater Vehicles for Scientific and Naval Operations" E. Bovio, *NATO Undersea Research Centre, Italy*

WELCOME TO CAMS 2004, ANCONA

New technologies and methodologies for control systems play a significant role on the development of surface vessels, floating structures, sub-sea vehicles, and other devices within the marine environment. Modelling, simulation, advanced control and artificial intelligence techniques can improve performance, reliability, security, economy and ecology of marine systems. The IFAC Conference on Control Applications in Marine Systems, July 7-9 2004, Ancona, Italy, aims at gathering the experts of the theory and applications of automatic control for the maritime systems, coming from Universities and Industries, in order to present the state of the art and the current research activities and advances in this field.

This booklet hosts the CAMS 2004 Program Schedule. The papers range from total control and modelling of vessels, underwater vehicles, off-shore structures to detailed control and modelling of ancillary and auxiliary subsystems. The conference is organized in 20 technical sessions, from which 8 sessions are focused on surface vessels, 6 sessions on underwater vehicles, 3 sessions on control and modelling of ancillary and auxiliary subsystems, 2 sessions on off-shore structure and 1 session on cooperative marine systems. The technical sessions are distributed over three days (July 7-9) together with 6 plenary sessions. The distinguished speakers for these sessions are:

- Professor Edoardo Bovio, NATO Undersea Research Centre, Italy
- Professor Kazuhiko Hasegawa, Osaka University, Japan
- Rear-Admiral Dino Nascetti, Italian Navy, Italy
- Professor Asgeir Johan Sørensen, Norwegian University of Science and Technology, Norway
- Doctor Richard Stephens, ALSTOM Power Conversion, UK
- Professor Edwin Zivi, U. S. Naval Academy, Annapolis, USA

Finally, the technical programme is completed with a one-day tutorial (July 6):

- Professor Mogens Blanke, Technical University of Denmark, Denmark

The organisers would like to thank the members of the International Program Committee and the National Organising Committee for helping in reviewing the papers and supporting the organisation. Special thanks to Dr. Andrea Monteriù for his effort in organizing different technical activities, to Dr. Paola Traferro for dealing with the secretariat and to Dr. Pierluigi Antonini for managing the conference home web page.

With the great opportunity offered by CAMS04, we would like to invite you to visit the Marche region for discovering its historical parts and its beautiful colours, the transparency of the sea, the green of the hills and the blue of the mountains.

Reza Katebi *Sauro Longhi*

International Programme Committee (IPC)

M.J. Grimble (UK) (Chair)
A. Mazzoli (Italy) (Vice-Chair)
R. Katebi (UK) (Editor)
J. Batlle (Spain)
D. Bertin (Italy)
M. Blanke (Demark)
R.S. Burns (UK)
A. Caiti (Italy)
M. Haro Casado (Spain)
G. Casalino (Italy)
G. Conte (Italy)
R. Cristi (USA)
D. C. Donha (Brasil)
D. Dumitrescu (Romania)
P. Fabiani (France)
T.I. Fossen (Norway)
M. Gerigk (Poland)
J.M. Giron-Sierra (Spain)
K. Hasegawa (Japan)
T. Holzhueter (Germany)
L. Jetto (Italy)
C.G. Källström (Sweden)
K. Kijima (Japan)
N.E. Leonard (USA)
S. Longhi (Italy)
A. Lozowicki (Poland)
S. Mandzuka (Croatia)
K. Ohtsu (Japan)
A. Pascoal (Portugal)
M.M.A. Pourzanjani (UK)
G. Ren (China)
G. Roberts (UK)
A.J. Sørensen (Norway)
A. Serrani (USA)
R. Sutton (UK)
A. Tiano (Italy)
J. van Amerongen (The Netherlands)
G. Veruggio (Italy)
Z. Vukić (Croatia)
I. Yamamoto (Japan)
R. Yoerger (USA)
J. Yuh (USA)

National Organizing Committee (NOC)

S. Longhi (Università Politecnica delle Marche - Ancona) (*Chair*)
D. Bertin (Calzoni spa) (*Vice-Chair from Industry*)
A. Caiti (Università di Pisa) (*Vice-Chair*)
A. Tiano (Università di Pavia) (*Publicity Chair*)
P. Antonini (Università Politecnica delle Marche - Ancona)
G. Ippoliti (Università Politecnica delle Marche - Ancona)
D. Fabri (Università Politecnica delle Marche - Ancona)
A. Martino (Università Politecnica delle Marche - Ancona)
A. Monteriù (Università Politecnica delle Marche - Ancona)
M. Vaccarini (Università Politecnica delle Marche - Ancona)

Sponsors:

- IFAC - International Federation of Automatic Control
  Technical Committee on Marine Systems
  http://www.ifac-control.org

Cosponsors:

- Università Politecnica delle Marche
  Ancona, Italy
  http://www.univpm.it
- Dipartimento di Ing. Informatica, Gestionale e dell'Automazione
  http://www.diiga.univpm.it
- Calzoni s.r.l.
  Milan, Italy
  http://www.calzonispa.com
- Fincantieri - Cantieri Navali Italiani S.p.A.
  Trieste, Italy
  http://www.fincantieri.it
- International Shipyards Ancona
  Ancona, Italy
  http://www.isayachts.com
- National Instruments
  Milan, Italy
  http://www.ni.com
- Rockwell Automation
  Milan, Italy
  http://www.rockwell.com

The Conference is also supported by:

- Fondazione della Cassa di Risparmio di Fermo
  Fermo, Italy
  http://fondazione.carifermo.it
- Assessorato al Turismo, Regione Marche
  Italy
  http://www.regione.marche.it

GENERAL INFORMATION

Date and Place

The IFAC Conference on Control Applications in Marine Systems will be held in Ancona, Italy, on July 7-9, 2004 at the Università Politecnica delle Marche, Engineering Faculty, via Brecce Bianche n°12. Sessions will take place in the 'Aula Magna' and 'Aula 150/1'.

CAMS 2004 Secretariat

Università Politecnica delle Marche
Dipartimento di Ingegneria Informatica, Gestionale e dell'Automazione
Via Brecce Bianche n°12
60131 Ancona - ITALY

Telephone: (+39) 071 220 4451
Fax: (+39) 071 220 4474

Email: cams04@univpm.it

Official language

The official language of the conference is English. All the presentations must be made in the official language.

Registration Hours

Conference Reception desk will be open for registration and general information from Tuesday, July 6 at 16:30 and it will remain open from 8:30 to 17:00 during the conference.

Tutorial Course

A one-day tutorial for CAMS attendees is scheduled on Tuesday, 6 July: "Diagnosis and Fault Tolerant Control for Marine Systems", Professor Mogens Blanke, Technical University of Denmark, Denmark.

Technical visits

Technical visits with a reduced number of participants will be planned. Further details are available at the Registration Desk.

Social Events

Banquet will be held on Thursday, July 8 at 20:00 at the Restaurant Monte Conero (via Monte Conero, 60020 Sirolo (AN), tel:0719330592). A bus service will be scheduled from the hotels to the restaurant.

Lunches

Lunches will be served in the faculty building , where the conference will take place. Refreshments will be served during coffee breaks in front of the conference lecture rooms. Lunches and refreshments are free for all delegates.

Transportation

City bus:
City buses are the most common way of transportation in Ancona. It is advised to bought bus tickets from tobacconists or news agents (€ 0,90) but they can also be bought directly from the driver (€ 1,4). Buses (n° 1/4 is recommended) run from the centre of Ancona, where the hotels are located, or from the railway station to Tavernelle (bus terminal). The conference site, situated on the top of the hill, is within a few minutes walk (from the bus terminal).

Bus shuttle:
A bus shuttle service will be scheduled from the Hotels to the Engineering Faculty (in the morning, before the plenary sessions) and from the Engineering Faculty to the Hotels (in the afternoon at the end of scheduled technical sessions).
Further information on the shuttle timetable and stops will be available at the reception of each hotel and on the "*news*" page at the *http://cams04.univpm.it*. Anyway you will receive the conference dossier with full details about service when you register.

Taxi:
If you need a taxi, just call:
Railway Station, P.zza Rosselli, Tel (+39) 071 43321

SPEAKER INFORMATION

Before the session starts

1. Fill out the "*Details of Speakers*" form.
2. Check with the organizers if you need specific equipment or help.
3. Check date, time and location of your session on the CAMS 2004 Program Schedule enclosed in this booklet.
4. Meet your chairpersons and hand out the "*Details of Speakers*" form.

15 minutes before the session starts

- Contact technical staff in the session room, if you are using computer for your presentation, copy your files and test presentation (an USB-pen is available at the Registration Desk for each session).
- Copy in advantage (it is kindly recommended) your files in the USB-pen provided by the conference staff at the Registration Desk, an USB-pen per session, and test presentation on the workstation near the Registration Desk.
- Where it is possible you should use the PC which will be available on the session rooms.

Presentation

Keep time limit of 20 minutes for each presentation.

After the presentation

Remain in the session for the final discussion or additional questions.

Technical equipment

USB-pen, overhead projector and video projector connected to a PC are available in conference rooms. The PC is equipped with:

- Windows XP Home Edition;
- Office XP Premium;
- Winzip 8.0;
- WinRAR 2.71;
- Acrobat Reader 5.0;
- 1024 X 768 graphic resolution with 65536 colours (16 bit)

Tutorial Course

Room: Aula 160/3

Tuesday, July 6 9:30 - 16.30 h

Diagnosis and Fault Tolerant Control for Marine Systems

M. Blanke
Technical University of Denmark, Denmark

Topics:

Fault-tolerant control aims at graceful degradation of automates systems in case of faults. It satisfies industrial demands for enhanced availability and safety, in contrast to traditional implementations where a supervisory system just make a sudden shut down, and hence cause loss of availability, when a fault is detected.

The lectures provide participants with an understanding of theory and methods that have proven themselves worthy in practical applications.

The lectures use examples from marine control and navigation to illustrate the theory.

Reference:

M. Blanke, M. Kinnaert, J. Lunze and M. Staroswiecki, "Diagnosis and Fault-tolerant Control", Springer 2003. ISBN 3-540-01056-4

Welcoming Reception Registration

Registration desk in front of the Aula Magna

Tuesday, July 6 16.30 h

SESSIONS SCHEDULE - WEDNESDAY, JULY 7

Opening Ceremony
Room: Aula Magna
Wednesday, July 7 8:45 - 9:00 h

Welcome
Prof. M. Pacetti
Rector of Università Politecnica delle Marche
Prof. G. Latini
Dean of Engineering Faculty

Plenary W1: Invited Paper
Room: Aula Magna
Wednesday, July 7 9:00 - 9:40 h

Chair: A. Mazzoli (Italy)

Structural issues in the design of marine control systems
A.J. Sørensen
Norwegian University of Science and Technology, Trondheim, Norway

Session WA1: Course Planning and Control
Room: Aula Magna
Wednesday, July 7 9:40 - 10:40 h

Chairs: T. Leo (Italy), K. Ohtsu (Japan)

1. **Path following of straight lines and circles for marine surface vessels**
   M. Breivik, T.I. Fossen
   University of Science and Technology, Trondheim, Norway.
2. **Geometric ship track following control**
   G. Hearns, R.I. Stephens
   Alstom Power Conversion Ltd, Rugby, UK
3. **Development of automatic course modification system using fuzzy inference**
   Y. Furukawa, K. Kijima, H. Ibaragi
   Kyushu University, Fukuoka, Japan

Session WB1: Fault Tolerant Control and Fault Detection
Room: Aula 150/1
Wednesday, July 7 9:40 - 10:40 h

Chairs: D. Bertin (Italy), M. Blanke (Denmark)

1. **An intelligence fusion system for ship fault-tolerant control**
   T. Tang, G. Yao
   Shanghai Maritime University, Shanghai, P. R. China

2. **Diagnosis of actuator faults in AUVs based on neural networks**
   G. Antonelli[*], F. Caccavale[**], C. Sansone[***], L. Villani[***]
   [*] DAEIMI - Università degli Studi di Cassino, Cassino, Italy
   [**] DIFA - Università degli Studi della Basilicata, Potenza, Italy
   [***] DIS - Università degli Studi di Napoli Federico II, Napoli, Italy

3. **Neuro-fuzzy modelling of marine diesel engine cylinder dynamics**
   R. Antonić[*], Z. Vukić[**], O. Kuljača[***]
   [*] University of Split, Split, Croatia
   [**] University of Zagreb, Zagreb, Croatia
   [***] Alcorn State University, Mississipi, USA

Session WA2: Roll Motion Control - Part A

Room: Aula Magna
Wednesday, July 7 11:10 - 12:50 h

Chairs: A. Fernández Ameal (Spain), A. Tiano (Italy)

1. **A two layer controller for integrated fin and rudder roll stabilisation**
   R. Katebi
   University of Strathclyde, Glasgow, UK

2. **On constrained control of fin, rudder or combined fin-rudder stabilizers: a quasi-adaptive control strategy**
   T. Perez, G.C. Goodwin
   The University of Newcastle, Callaghan, Australia

3. **Fin and rudder hybrid stabilization system**
   H. Oda[*], T. Hyodo[*], M. Kanda[*], H. Fukushima[**], K. Nakamura[**], S. Takeda[***], T. Hayashi[***], H. Fujiwara[***]
   [*] Akishima Laboratories (Mitsui Zosen) Inc., Tokyo, Japan
   [**] Mitsui Engineering & Shipbuilding Co., Okayama, Japan
   [***] Tokyo University of Marine Science and Technology, Tokyo, Japan

4. **Switched control system for ship roll stabilization**
   A.-Z. Engeln[*], A.J. Koshkouei[*], G.N. Roberts[**], K.J. Burnham[*]
   [*] Coventry University, Coventry, UK
   [**] University of Wales College, Newport, UK

5. **State-space representation of memory effects in foil lift force**
   E. Kristiansen, O. Egeland
   Norwegian University of Science and Technology, Trondheim, Norway

Session WB2: Off-Shore Systems Modelling and Control

Room: Aula 150/1
Wednesday, July 7 11:10 - 12:50 h

Chairs: T.I. Fossen (Norway), A. Mazzoli (Italy)

1. **A robotic system for off-shore plants decommissioning**
   E. Cavallo, R.C. Michelini, R.M. Molfino
   University of Genova, Genova, Italy
2. **Observer design for a towed seismic streamer cable**
   T.D. Nguyen, O. Egeland
   Norwegian University of Science and Technology, Trondheim, Norway
3. **Hydrodynamic properties important for control of trawl doors**
   K.-J. Reite[*] , A.J. Sørensen[**]
   [*] SINTEF Fisheries and Aquaculture, Trondheim, Norway
   [**] Norwegian University of Science and Technology, Trondheim, Norway
4. **Nonlinear observer design for a nonlinear cable/string FEM model using contraction theory**
   Y. Türkyilmaz, J. Jouffroy, O. Egeland
   Norwegian University of Science and Technology, Trondheim, Norway
5. **Optimisation of a wave energy converter**
   J. Ringwood, S. Butler
   National University of Ireland, Maynooth, Ireland

Plenary W2: Invited Paper

Room: Aula Magna
Wednesday, July 7 14:00 - 14:40 h

Chair: R. Katebi (UK)

Aspects of industrial dynamic positioning: reality-tolerant control
R.I. Stephens
Alstom Power Conversion Ltd, Rugby, UK

Session WA3: Roll Motion Control - Part B

Room: Aula Magna
Wednesday, July 7 14:40 - 15:40 h

Chairs: R. Katebi (UK), G. Orlando (Italy)

1. **Glider's roll control based on backstepping**
   L. Burlion, T. Ahmed-Ali, N. Seube
   Ecole Nationale Supérieure des Ingénieurs des Etudes et Techniques d'Armement, Brest, France
2. **Rudder-roll damping effect by control of the rudder command time moments**
   V. Nicolau, C. Miholca, G. Puscasu, S. Judele
   University of Galati, Galati, Romania
3. **A gain scheduled control law for fin/rudder roll stabilisation of ships**
   H. Tanguy[,**], G. Lebret[**]*
   [*] SIREHNA, Nantes - France
   [**] IRCCyN, Nantes - France

Session WB3: ICT for Ships

Room: Aula 150/1
Wednesday, July 7 14:40 - 15:40 h

Chairs: M. Panti (Italy), R. Sutton (UK)

1. **ASFOSS – Current information system using AIS**
   H. Korte, J. Ladisch, M. Wulff, C. Korte, J. Majohr
   University of Rostock, Warnemünde, Germany
2. **Autonomous fast ship physical model with actuators for 6DOF motion smoothing experiments**
   J. Recas, J.M. Giron-Sierra, S. Esteban, B. de Andres-Toro, J.M. De la Cruz, J.M. Riola
   Universidad Complutense de Madrid, Madrid, Spain
3. **A holistic approach to the all-electric ship**
   B. Taylor[*], P. Gaffney[**], W. Nickerson[***]
   [*] GasTOPS Ltd., Weehawken, USA
   [**] Rockwell Automation, Norristown, USA
   [***] RLW Inc., State College Ottawa, USA

Session WA4: Ship Modelling and Control

Room: Aula Magna
Wednesday, July 7 16:10 - 17:30 h

Chairs: D.C. Donha (Brazil), A. Tiano (Italy)

1. **Recursive identification procedure of the nonlinear model ship based on the turning test manoeuvring**
   M. Haro Casado[*], A. Fernández Ameal[**]
   [*] University of Cádiz, Cádiz, Spain
   [**] Universidad de la Coruña, La Coruña, Spain

2. **Modeling, identification, and adaptive maneuvering of CyberShip II: a complete design with experiments**
   R. Skjetne, Ø.N. Smogeli, T.I. Fossen
   Norwegian University of Science and Technology, Trondheim, Norway
3. **Advances in the 6 DOF motions model of a fast ferry**
   J.M. Giron-Sierra, B. de Andres-Toro, S. Esteban, J. Recas, J.M. De la Cruz, J.M. Riola
   Universidad Complutense de Madrid, Madrid, Spain
4. **State-space representation of frequency-dependent hydrodynamic coefficients**
   Å. Hjulstad , E. Kristiansen , O. Egeland
   Norwegian University of Science and Technology, Trondheim, Norway

Session WB4: Control Design for Marine Systems

Room: Aula 150/1
Wednesday, July 7 16:10 - 17:30 h

Chairs: L. Jetto (Italy), A. Lozowicki (Poland)

1. **Electronic control of an underwater breathing apparatus**
   F. Garofalo , S. Manfredi, S. Santini
   Università di Napoli Federico II, Napoli, Italy
2. **Force control of a load through the splash zone**
   B. Skaare, O. Egeland
   Norwegian University of Science and Technology, Trondheim, Norway
3. **Augmented reality supports real-time diagnosis and repair of shipboard systems**
   F. M. Discenzo[*], D. Chung[*], S.L. Chen[**], R. Behringer[**], V. Sundareswaran[**], D. Carnahan[*], K. Wang[**], J. Molineros[**], J. McGee[**]
   [*] Rockwell Automation, Mayfield Hts., USA
   [**] Rockwell Scientific, Thousand Oaks, USA
4. **Optimal planning of cargo operations at bunkering tankers with respect to dynamical character of their parameter restrictions**
   Y.P. Kondratenko, G.F. Romanovsky, D.M. Pidopryhora, G.V. Kondratenko
   Ukrainian State Maritime Technical University, Mykolaiv, Ukraine

Plenary T1: Invited Paper

Room: Aula Magna
Thursday, July 8 9:00 - 9:40 h

Chair: M. Blanke (Denmark)

Italian navy trends in automation of ship controls
D. Nascetti
Italian Navy, Italy

Session TA1: Ship Track and Course Keeping

Room: Aula Magna
Thursday, July 8 9:40 - 10:40 h

Chairs: D. Bertin (Italy), J.M. Giron-Sierra (Spain)

1. **A geometric approach to a pursuing problem**
   L. Consolini, M. Tosques
   Università degli studi di Parma, Parma, Italy
2. **Trajectory tracking control system for ship**
   J. Pomirski, L. Morawski, A. Rak
   Gdynia Maritime University, Gdynia, Poland
3. **Optimal design of 2-DOF digital controller for ship course control system**
   J. Ladisch[*], K. Polyakov[**], B.P. Lampe[*], E.N. Rosenwasser[**]
   [*] University of Rostock, Rostock, Germany
   [**] State University of Ocean Technology, St. Petersburg, Russia

Session TB1: Modelling and Identification of AUV's - Part A

Room: Aula 150/1
Thursday, July 8 9:40 - 10:40 h

Chairs: T.I. Fossen (Norway), S. Zanoli (Italy)

1. **Neural network augmented identification of underwater vehicle models**
   P.W.J van de Ven[*], T.A. Johansen[**], A.J. Sørensen[**], C. Flanagan[*], D. Toal[*]
   [*] University of Limerick, Limerick, Ireland
   [**] Norwegian University of Science and Technology, Trondheim, Norway
2. **Observer Kalman filter identification of an autonomous underwater vehicle**
   A. Tiano[*], R. Sutton[**], A. Lozowicki[***], W. Naeem[**]
   [*] Università degli Studi di Pavia, Pavia, Italy
   [**] University of Plymouth, Plymouth, UK
   [***] Technical University of Szczecin, Szczecin, Poland

3. **Quasi-static thrust model identification of a ocean explorer class AUV**
   D. Cecchi[*], *A. Caiti*[*], *M. Innocenti*[*], *E. Bovio*[**]
   [*] Università di Pisa, Pisa, Italy
   [**] NATO Undersea Research Centre, La Spezia, Italy

Session TA2: Ship Intelligent Control

Room: Aula Magna
Thursday, July 8 11:10 - 12:50 h

Chairs: L. Jetto (Italy), R. Katebi (UK)

1. **Automatic cost weight selection in mixed sensitivity H-infinity controller synthesis**
   D.C. Donha[*], *R. Katebi*[**]
   [*] University of São Paulo, São Paulo, Brazil
   [**] University of Strathclyde, Glasgow, UK
2. **Fuzzy rudder-roll damping system based on analysis of the autopilot commands**
   V. Nicolau, E. Ceanga
   University of Galati, Galati, Romania
3. **Specialized learning for ship intelligent track-keeping using neurofuzzy**
   Y. Zhuo, G.E. Hearn
   University of Southampton, Southampton, UK
4. **Minimum time ship maneuvering using neural network and nonlinear model predictive compensator**
   N. Mizuno[*], *M. Kuroda*[*], *T. Okazaki*[**], *K. Ohtsu*[***]
   [*] Nagoya Institute of Technology, Nagoya, Japan
   [**] National Maritime Research Institute, Tokyo, Japan
   [***] Tokyo University of Marine Science and Technology, Tokyo Japan
5. **Multi-agent technology for robust control of shipboard chilled water system**
   P. Tichý[*], *P. Šlechta*[*], *F.P. Maturana*[**], *R.J. Staron*[**], *K.H. Hall*[**], *V. Mařík*[*], *F.M. Discenzo*[**]
   [*] Rockwell Automation Research Center, Prague, Czech Republic
   [**] Rockwell Automation, Mayfield Hts., USA

Session TB2: Robust Control of Underwater Vehicles

Room: Aula 150/1
Thursday, July 8 11:10 - 12:50 h

Chairs: G. Ippoliti (Italy), I. Yamamoto (Japan)

1. **Composite control of a tethered underwater flight vehicle**
   Z. Feng, R. Allen
   University of Southampton, Southampton, UK

2. **Extension of feasible region of control allocation for open-frame underwater vehicles**
   E. Omerdic[*]*, G.N. Roberts*[**]
   [*] University of Limerick, Limerick, Ireland
   [**] University of Wales College, Newport, UK
3. **Robust control of an underwater ROV in the presence of nonsmooth nonlinearities in the actuators**
   M.L. Corradini[**]*, G. Orlando*[*]
   [*] Università Politecnica delle Marche, Ancona, Italy
   [**] Università di Lecce, Lecce, Italy
4. **Model predictive control of a remotely operated flight vehicle**
   M. Wang, R. Sutton
   University of Plymouth, Plymouth, UK
5. **Robust station-keeping of underwater vehicles under velocity measurement offsets**
   A. Serrani
   The Ohio State University, Columbus, USA

Plenary T2: Invited Paper

Room: Aula Magna
Thursday, July 8 14:00 - 14:40 h

Chair: R. Sutton (UK)

Some recent developments of next generation's marine traffic systems
K. Hasegawa
Osaka University, Osaka, Japan

Session TA3: High Speed Vessels (Invited Session)

Room: Aula Magna
Thursday, July 8 14:40 - 16:00 h

Chairs: J. Aranda Al Mansa (Spain), J.M. Giron-Sierra (Spain)

1. **The problem of the coupling of the vertical movement control with roll movement in fast ferries**
   J. Aranda Al Mansa, R. Muñoz-Mansilla, J. M. Díaz Martínez
   Universidad Nacional de Educación a Distancia (UNED), Madrid, Spain

2. **Pitch movement QFT control to reduce the MSI of a turbo ferry**
   F.J. Velasco[*], T.M. Rueda[*], E. López[**], E. Moyano[*]
   [*] Univ. De Cantabria, Santander, Spain
   [**] Univ. del País Vasco, Bizkaia, Spain
3. **Selection and tuning of controllers by evolutionary algorithms: application to fast ferries control**
   M. Parrilla Sánchez, J. Aranda Al Mansa, J.M. Díaz Martínez
   Universidad Nacional de Educación a Distancia (UNED), Madrid, Spain
4. **New results about model based study of seasickness in fast ferries**
   J.M. Giron-Sierra, B. Andres-Toro, S. Esteban, J.M. Riola, J. Recas, J.M. De la Cruz
   Universidad Complutense de Madrid, Madrid, Spain

Session TB3: Modelling and Identification of AUV's - Part B

Room: Aula 150/1
Thursday, July 8 14:40 - 16:00 h

Chairs: A.M. Perdon (Italy), A.J. Sørensen (Norway)

1. **Identification of underwater vehicle hydrodynamic coefficients using free decay tests**
   A. Ross, T.I. Fossen, T.A. Johannsen
   Norwegian University of Science and Technology, Trondheim, Norway
2. **AUV dynamics: modelling and parameter estimation using analytical, semi-empirical, and CFD methods**
   E.A. de Barros[*], A. Pascoal[**], E. de Sa[***]
   [*] University of São Paulo, São Paulo, Brazil
   [**] Instituto Superior Técnico, Lisbon, Portugal
   [***] National Institute of Oceanography, Goa, India
3. **Identification of underwater vehicles by a Lyapunov method**
   A. Tiano
   Università degli Studi di Pavia, Pavia, Italy

Plenary F1: Invited Paper

Room: Aula Magna
Friday, July 9 9:00 - 9:40 h

Chair: M. Blanke (Denmark)

Design of robust shipboard power automation systems
E. Zivi
U.S. Naval Academy, Annapolis, USA

Session FA1: Pose and Motion Estimation of AUV's

Room: Aula Magna
Friday, July 9 9:40 - 10:40 h

Chairs: G. Indiveri (Italy), R. Sutton (UK)

1. **Study and implementation of an EKF GIB-based underwater positioning system**
   A. Alcocer, P. Oliveira, A. Pascoal
   Istituto Superior Técnico, Lisboa, Portugal
2. **Visual-feedback positioning of a ROV**
   G. Conte, S.M. Zanoli, D. Scaradozzi, S. Maiolatesi
   Università Politecnica delle Marche, Ancona - Italy
3. **Vision-based ROV horizontal motion control: experimental results**
   M. Caccia
   CNR-ISSIA, Genova, Italy

Session FB1: Control of Thrusters and Propulsion Systems

Room: Aula 150/1
Friday, July 9 9:40 - 10:40 h

Chairs: O. Egeland (Norway), A. Serrani (USA)

1. **Thruster control for the positioning of the marine vehicles via feedback linearization and sliding control approaches**
   M. Haro Casado[*] *, A. Fernández Ameal*[**]
   [*] University of Cádiz, Cádiz, Spain
   [**] Universidad de la Coruña, La Coruña, Spain
2. **Design of a hybrid power/torque thruster controller with loss estimation**
   Ø.N. Smogeli, A.J. Sørensen, T.I. Fossen
   Norwegian University of Science and Technology, Trondheim, Norway
3. **Actuators and control design for fast ferry using seasickness criteria**
   S. Esteban, J.M. Giron-Sierra, J. Recas, J.M. Riola, B. de Andres-Toro, J.M. De la Cruz
   Universidad Complutense de Madrid, Madrid, Spain

Session FA2: Intelligent and Hybrid Control of Underwater Vehicles

Room: Aula Magna
Friday, July 9 11:10 - 12:50 h

Chairs: I. Yamamoto (Japan), S. Zanoli (Italy)

1. **A soft computing method for an AUV navigation system with pseudo-real-time applicability**
   D. Loebis, R. Sutton, J. Chudley
   The University of Plymouth, Plymouth, UK
2. **Neural network control system for underwater robots**
   A.A. Dyda[*], D.A. Os'kin[**]
   [*] Maritime State University, Vladivostok, Russia
   [**] Russian Academy of Science, Vladivostok, Russia
3. **Model predictive control of an autonomous underwater vehicle with a fuzzy objective function optimized using a GA**
   W. Naeem, R. Sutton, J. Chudley
   University of Plymouth, Plymouth, UK
4. **Hierarchical switching scheme for PID control of underwater vehicles**
   G. Ippoliti, L. Jetto, S. Longhi
   Università Politecnica delle Marche, Ancona, Italy
5. **Improved line-of-sight guidance for cruising underwater vehicles**
   V. Bakaric[*], Z. Vukić[**], R. Antonić[***]
   [*] Brodarski institut, Zagreb, Croatia
   [**] University of Zagreb, Zagreb, Croatia
   [***] Split College of Maritime Studies, Split, Croatia

Session FB2: Cooperative Marine Systems

Room: Aula 150/1
Friday, July 9 11:10 - 12:50 h

Chairs: K. Hasegawa (Japan), A. Serrani (USA)

1. **Experimental results on synchronization control of ship rendezvous operations**
   E. Kyrkjebø[*], M. Wondergem[**], K.Y. Pettersen[*], H. Nijmeijer[**]
   [*] Norwegian University of Science and Technology, Trondheim, Norway
   [**] Eindhoven Univ. of Tech., Eindhoven, Netherlands
2. **Methodology for dynamic analysis of offloading operations**
   H.M. Morishita, E.A. Tannuri, T.T. Bravin
   University of São Paulo, São Paulo, Brazil

3. **Collaborative exploration for a team of mobile robots: centralized and decentralized strategies**
   L. Giannetti, S. Pagnottelli, P. Valigi
   Università di Perugia, Perugia, Italy

4. **Desing and realization of a very low cost prototypal autonomous vehicle for coastal oceanographic missions**
   A. Alvarez[*], A. Caffaz[**], A. Caiti[***], G. Casalino[***], E. Clerici[**], F. Giorgi[**], L. Gualdesi[****], A. Turetta[***]
   [*] IMEDEA - Instituto Mediterraneo de Estudios Avanzados, Esporlas, Spain
   [**] GRAALTECH s.r.l., Genova, Italy
   [***] University of Genova, Genova, Italy
   [****] SACLANT Undersea Research Ctr., La Spezia, Italy

5. **Sea trials of SESAMO: an autonomous surface vessel for the study of the air-sea interface**
   M. Caccia[*], R. Bono[*], Ga. Bruzzone[*], Gi. Bruzzone[*], E. Spirandelli[*], G. Veruggio[*], A.M. Stortini[**], G. Capodaglio[***]
   [*] CNR-ISSIA, Genova, Italy
   [**] CNR-IDPA, Venezia, Italy
   [***] Università Ca' Foscari, Venezia, Italy

Plenary F2: Invited Paper

Room: Aula Magna
Friday, July 9 14:00 - 14:40 h

Chair: R. Sutton (UK)

Autonomous underwater vehicles for scientific and naval operations
E. Bovio
NATO Undersea Research Centre, La Spezia, Italy

Session FA3: AUV Mission Planning and Control

Room: Aula Magna
Friday, July 9 14:40 - 15:40 h

Chairs: G. Conte (Italy), Z. Vukić (Croatia)

1. **An incremental stochastic motion planning technique for autonomous underwater vehicles**
   C.S. Tan, R. Sutton, J. Chudley
   The University of Plymouth, Plymouth, UK

2. **A switching path following controller for an underactuated marine vehicle**
   G. Indiveri[*]*, A. Pascoal*[**]
   [*] Università degli Studi di Lecce, Lecce, Italy
   [**] Instituto Superior Técnico, Lisboa, Portugal
3. **Polar applications of ROVs**
   Ga. Bruzzone, M. Caccia, R. Bono, Gi. Bruzzone, E. Spirandelli, G. Veruggio
   CNR-ISSIA, Genova, Italy

Session FB3: Devices and Simulation Tools for Marine Systems

Room: Aula 150/1
Friday, July 9 14:40 - 15:40 h

Chairs: A. Caiti (Italy), S. Longhi (Italy)

1. **The "Smart Spring" mounting system: a new active control approach for isolating marine machinery vibration**
   S. Daley, F.A. Johnson
   University of Sheffield, Sheffield, UK
2. **An underwater simulation environment for testing autonomous robot control architectures**
   J. Antich, A. Ortiz
   University of the Balearic Islands, Balearic Islands, Spain
3. **MVT: a marine visualization toolbox for Matlab**
   A.L. Danielsen, E. Kyrkjebø, K.Y. Pettersen
   Norwegian University of Science and Technology, Trondheim, Norway

Closing session

Room: Aula Magna
Friday, July 9 15:40 - 16:00 h