## PROGRAMME


20-22 SEPTEMBER 2006

Instituto Superior Técnico, Lisbon, Portugal

## ORGANIZERS

PÓLO DO I.S.T

INSTITUTO SUPERIOR TÉCNICO

IFAC

7TH IFAC CONFERENCE ON
**MANOEUVRING AND CONTROL OF MARINE CRAFT**

20-22 SEPTEMBER 2006

LISBON
PORTUGAL

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Institute for Systems and Robotics (ISR)
Lisbon, Portugal

IFAC – International Federation of Automatic Control

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## SCOPE and VENUE

The 7th IFAC Conference on Manoeuvring and Control of Marine Craft (MCMC'2006) will be held in Lisbon, Portugal, from September 20-22, 2006. The conference will take place at the Instituto Superior Técnico (IST), the school of engineering of the Technical University of Lisbon.

The MCMC'2006 will provide an excellent opportunity for the presentation and discussion of research and development work in the general area of *automatic control with applications to the maritime field*. Specific topics will include guidance and control, monitoring and surveillance, optimization and operations planning, modelling and identification, and operational safety. Motivated by recent, fast paced developments in the area, special attention will also be given to the discussion of a number of topics that include navigation, guidance, and control of robotic marine platforms and systems, including autonomous surface and underwater vehicles. Researchers and practitioners from these fields will be brought together to discuss common theoretical and practical problems, describe scientific and commercial applications, and explore avenues for future research.

This Conference is the seventh of a series of IFAC-sponsored meetings in the field of Manoeuvring and Control of Marine Craft, held on a triennial basis. The last two editions took place in Spain (MCMC'2003) and Denmark (MCMC'2000).

The MCMC'2006 is organized by the Instituto Superior Técnico (IST) in cooperation with the Institute for Systems and Robotics (ISR) and the Portuguese Association of Automatic Control (APCA), a national member organization of the International Federation of Automatic Control (IFAC).

## SOCIAL PROGRAMME

**WELCOME RECEPTION**
Wednesday September 20, 2006 18:15 -19:00
Congress Center of IST

**CONFERENCE BANQUET***
Thursday September 21, 2006 20:00 - 22:00
OCEANARIUM, EXPO 98

Other social activities to be proposed and arranged with local tour operator at the registration desk

* Included in the registration fee, extra tickets available at the registration desk.

## INFORMATION FOR PARTICIPANTS

The registration desk will be available at the Main Hall of the conference, locate in the Congress Center of the Instituto Superior Técnico.

All sessions will take place in the Congress Center of the Instituto Superior Técnico.

Plenary sessions and the opening and closing ceremonies will take place at the main Amphitheatre.

Coffee breaks will be served next to the Main Hall of the conference.

Speakers should introduce themselves to the chairperson 10 minutes before the starting of their sessions. In order to reduce the time between presentations, it is recommended that electronic files for projection be ready and tested in the computer of the room before the session begins.

## MCMC 2006 PROGRAMME

## Wednesday, 20th of September

8:00 – Conference registration starts

9:00 – 9:30 Opening session – Room Amphitheatre

**9:30 – 10:30 PLENARY SESSION**
**ROOM AMPHITHEATRE**

MARINE ROBOTS: ADVANCED TOOLS FOR MARINE SCIENCE
*Dana Yoerger (*WHOI, USA)

10:30 – 11:00 Coffee break

**11:00 - 12:20** [WeA-1] **CONTROL OF UNDERWATER VEHICLES I**
**Chair: Ettore Barros** (Univ. São Paulo - USP, Brasil)
**ROOM AMPHITHEATRE**

ROBUST DIVING CONTROL OF AN AUV
*Lionel Lapierre, Vincent Creuze, Bruno Jouvencel (LIRMM, Montpellier, France)*

UNDERACTUATED AUV ROBUST CONTROL
*Decio C. Donha, Juan C.C. Luque (Univ. São Paulo - USP, Brasil)*



ADAPTIVE CONTROL OF UNDERWATER VEHICLES
*Antonio Tiano, Zoran Lajic (Univ. Pavia, Italy), Marc Carreras (Univ. Girona, Spain)*

A 2D HOMING STRATEGY FOR AUTONOMOUS UNDERWATER VEHICLES
*P. Batista, Carlos Silvestre, Paulo Oliveira (IST/ISR, Portugal)*

**11:00 - 12:20** [WeA-2] **POWER AND PROPULSION SYSTEMS**
**Chair: Asgeir Sorensen** (NTNU, Norway)
**ROOM 02.1**

EXPERIMENTAL VALIDATION OF A MARINE PROPELLER THRUST ESTIMATION SCHEME
*L. Pivano, Ø. N. Smogeli, T. A. Johansen, T. I. Fossen (NTNU, Norway)*

OVERVIEW OF PROPULSION CONTROL FOR SURFACE VESSELS
*Eivind Ruth, Øyvind N. Smogeli, Asgeir J. Sørensen (NTNU, Norway)*

MIMO CONTROLLER CONCEPT FOR VESSELS WITH MODERN STEERING GEARS
*Holger Korte (MATNAV, Germany)*
*Bernhard P. Lampe, Jens Ladisch, Matthias Wulff, Cathleen Korte (Univ. Rostock, Germany)*

OPERATING CRITERIA FOR DESIGN OF POWER MANAGEMENT SYSTEMS ON SHIPS
*Damir Radan, Øyvind N. Smogeli, Asgeir J. Sørensen, Alf Kåre Ådnanes (NTNU, Norway)*

**11:00 - 12:20** [WeA-3] **ROLL MOTION CONTROL**
**Chair: Geoff Roberts** (Coventry Uv., UK)
**ROOM 02.2**

APPLICATION OF INVERSE CONTROL FOR BETTER ROLL STABILIZATION OF SHIPS USING ACTIVE ANTIROLL TANKS
*Reza Moaleji, Alistair R. Greig (Univ. College London, UK)*

NONLINEAR CONTROL DESIGN FOR INTEGRATED RUDDER ROLL STABILIZATION
*Reza Pawel Majecki, Reza Katebi, Michael J. Grimble (Univ Strathclyde, UK)*

THE APPLICATION OF SWITCHED CONTROL FOR SHIP ROLL STABILISATION
*G. Roberts, V. Cournou, B Vinsonneau, K. Burnham (Coventry Uv., UK)*

ADVANCED CONTROL STRATEGIES FOR THE ROLL STABILIZATION OF OCEAN MOTORYACHTS
*Giulia Gerini, Gianluca Ippoliti, Sauro Longhi, Giuseppe Orlando (Univ. Ancona, Italy)*
*Pasquale Scala (ISA Yachts, Ancona, Italy)*

12:20 – 14:00 Lunch



**14:00– 15:00 PLENARY SESSION**
**ROOM AMPHITHEATRE**

INSTRUMENTS FOR MARINE NAVIGATION: A HISTORICAL PERSPECTIVE
*Malhão Pereira* (Cmdt. Portuguese Navy)

**15:00 - 16:20** [WeB-1] **CONTROL OF UNDERWATER VEHICLES II**
**Chair: Decio Donha** (USP, Brasil)
**ROOM AMPHITHEATRE**

WEATHER OPTIMAL DYNAMIC POSITIONING OF UNDERACTUATED AUVS USING OUTPUT FEEDBACK CONTROL
*Jon e. Refsnes, Asgeir J. Sørensen, Kristin Y. Pettersen (NTNU, Norway)*

OBSERVER DESIGN FOR UNDERWATER VEHICLES WITH POSITION AND ANGLE MEASUREMENT
*Jon E. Refsnes, Kristin Y. Pettersen, Asgeir J. Sørensen (NTNU, Norway)*

NONLINEAR CONTROL OF AN UNDERWATER TRANSDUCER TOWED VEHICLE
*Francisco C. Teixeira,, A. Pedro Aguiar, António M. Pascoal (IST/ISR, Portugal)*

CONTROL OF THE MAYA AUV IN THE VERTICAL AND HORIZONTAL PLANES: THEORY AND PRACTICAL RESULTS
*P. Maurya, E. Desa, A. Pascoal, G. Navelkar, R Madhan, A. Mascarenhas, S.Prabhudesai, S. Afzulpurkar, A. Gouveia, S. Naroji, L. Sebastiao (NIO, Goa, INDIA and IST/ISR, Portugal)*

**15:00 - 16:20** [WeB-2] **VISION IN MARINE ROBOTICS**
**Chair: Massimo Caccia** *(CNR-ISSIA Genova,Italy)*
**ROOM 02.1**

VISION-BASED SLAM FOR ROVS: PRELIMINARY EXPERIMENTAL RESULTS
*Massimo Caccia (CNR-ISSIA Genova,Italy)*

VISION-BASED AUTONOMOUS SURFACE VEHICLE DOCKING MANOEUVRE
*Martins, J. M. Almeida, E. P. Silva (ISEP, Porto, Portugal)*
*F. L. Pereira (FEUP, Porto, Portugal)*

VISION SYSTEMS IN THE CONTROL OF AUTONOMOUS UNDERWATER VEHICLES
*Jonathan Horgan, Daniel Toal (Univ. Limerick, Ireland)*

VISION-BASED CONTROL IN AUTONOMOUS MANIPULATION FOR INTERVENTION MISSIONS AUV
*Giacomo Marani (Univ. Hawaii, USA), J. Yuh (NSF, USA)*

**15:00 - 16:20** [WeB-3] **COOPERATIVE SHIP CONTROL**
**Chair: Kristin Pettersen** (NTNU, Norway)
**ROOM 02.2**

CONTROLLER DESIGN FOR A FLEET OF SHIPS
*E. Shimizu (Tokyo University of Marine Science and Technology, Japan)*
*E. Pedersen (NTNU, Norway)*

AUTONOMOUS SCALED SHIPS FOR EXPERIMENTAL STUDY OF COOPERATIVE MARINE ROBOTICS
*C. Leon, J.M. Giron-Sierra, S. Esteban (Univ. Complutense de Madrid, Spain)*



A TWO LINKED SHIPS COOPERATIVE SCENARIO
*J.M. Giron-Sierra,* A. Dominguez, *Carlos Leon (Univ.Complutense, Madrid, Spain)*

HYBRID SIMULATION OF THE ALONGSIDE MANOEUVRE OF SHIPS ACTING IN COOPERATION
*Francisco J. Velasco, Emiliano Moyano, Eloy López, Amaya Lombera, Teresa M. Rueda, José M. Riola (Univ. De Cantabria, Santander Spain, Univ. del País Vasco, Bizkaia,Spain, and Univ. Politécnica de Madrid, Spain)*

16:20 – 16:50 Coffee break

**16:50 - 18:10** [WeC-1] **FORMATION CONTROL**
**Chair: João Sousa** (FEUP, Portugal)
**ROOM AMPHITHEATRE**

LEADER-FOLLOWER DYNAMIC SYNCHRONIZATION OF SURFACE VESSELS
*Erik Kyrkjebø, Kristin Y. Pettersen (NTNU, Norway)*

FORMATION CONTROL OF UNDERACTUATED MARINE VEHICLES WITH COMMUNICATION CONSTRAINTS
*Even Børhaug, Alexey Pavlov, Reza Ghabcheloo , Kristin Y. Pettersen, António Pascoal, Carlos Silvestre (NTNU, Norway and IST/ISR, Portugal)*

COORDINATED PATH FOLLOWING CONTROL OF MULTIPLE AUVS IN THE PRESENCE OF COMMUNICATION FAILURES AND TIME DELAYS
*Reza Ghabcheloo, A. Pedro Aguiar, António Pascoal, Carlos Silvestre (IST/ISR, Portugal)*

GUIDED FORMATION CONTROL FOR FULLY ACTUATED MARINE SURFACE CRAFT
*Morten Breivik, Maxim V. Subbotin, Thor I. Fossen (NTNU, Norway)*

**16:50 - 18:10** [WeC-2] **FAULT DETECTION AND TOLERANT SYSTEMS**

**Chair: Zoran Vukic**
**ROOM 02.1**

FAULT-TOLERANT SENSOR FUSION FOR MARINE NAVIGATION
*Mogens Blanke (Tech. Univ. Denmark, Denmark)*

FUZZY FAULT DETECTION AND ISOLATION IN ELECTRO-HYDRAULIC MARINE CONTROL SYSTEMS
*L. F. Mendonça, C. A. Silva, L. F. Baptista (ENIDH-IDMEC, Portugal)*

COMPARISON OF TWO FREQUENCY BASED PI METHODS ON SHIPS DYNAMICS
*R. Ferreiro García (Univ. Coruña, Spain), M. Haro Casado (Univ. Cádiz, Spain)*

**16:50 - 18:10** [WeC-3] **MOTION PLANNING**

**Chair: Giovanni Indiveri**
**ROOM 02.2**

MOTION PLANNING FOR COORDINATED OPERATION OF MULTIPLE NONHOLONOMIC VEHICLES UNDER CONSTANT DISTURBANCE
*Jorge Silva (ISEP, Porto, Portugal)*
*João Sousa (FEUP, Porto, Portugal)*

INTELLIGENT SHIP STEERING SYSTEM
*Roman Śmierzchalski (Gdynia Maritime University; Poland)*

ON PLANNING SMOOTH PATHS FOR MARINE VEHICLES
*Giovanni Indiveri, Gianfranco Parlangeli (Univ. Lecce, Italy)*



MULTI PSEUDO BANG BANG CONTROL GENETIC OPTIMIZATION FOR SHIP TRAJECTORY PLANNING
*J.M. Giron-Sierra, Santiago Cifuentes, Juam Jimenez (Univ.Complutense Madrid, Spain)*

18:15 – Welcome reception

## Thursday, 21st of September

**8:30 – 9:30 PLENARY SESSION**
**ROOM AMPHITHEATRE**

FUTURE DEVELOPMENTS AND APPLICATIONS OF MARINE ROBOTICS
*James Bellingham* (MBARI, USA)

**9:30 - 10:30** [ThA-1] **PATH-FOLLOWING AND TRAJECTORY TRACKING**

**Chair: L. Lapierre** (LIRMM, Montpellier, France)
**ROOM AMPHITHEATRE**

LOS PATH FOLLOWING FOR UNDERACTUATED UNDERWATER VEHICLE
*Even Børhaug, Kristin Y. Pettersen (NTNU, Norway)*

PATH FOLLOWING PREVIEW CONTROL OF AUVS: AN APPLICATION TO THE INFANTE VEHICLE
*Nuno Paulino, Carlos Silvestre, Rita Cunha, António Pascoal (IST/ISR, Portugal)*

MANOEUVRE-AUTOMATON BASED MOTION PLANNING AND TRAJECTORY TRACKING OF AN AUTONOMOUS MARINE VEHICLE
*W. Naeem, C. S. Tan, R. Sutton, J. Chudley (Univ. Plymouth, UK)*

**9:30 - 10:30** [ThA-2] **SHIP MODELLING AND IDENTIFICATION**
**Chair: R. Ferreiro** (Univ. Coruña, Spain)
**ROOM 02.1**

A FREQUENCY-DOMAIN APPROACH TO MODELLING AND IDENTIFICATION OF THE FORCE TO MOTION VESSEL RESPONSE
*Tristan Perez, Øystein Lande (NTNU, Norway)*

AN IMPROVEMENT IN AIS: THE IDENTIFICATION OF THE SHIP
*Manuel Haro Casado (Univ. Cádiz, Spain)*
*Ramon Ferreiro (Univ. Coruña, Spain)*

LOW ORDER POTENTIAL DAMPING MODELS FOR SURFACE VESSELS
*Kari Unneland, Thor I. Fossen, Paul Van Dooren, Olav Egeland (NTNU, Norway)*

**9:30 - 10:30** [ThA-3] **AUV MISSION PLANNING**
**Chair: R. Katebi** (*ICC, Univ. of Strathclyde, UK*)
**ROOM 02.2**

AUTONOMOUS AND DECENTRALIZED MISSION PLANNING FOR CLUSTERS OF UUVS
*L. Giovanini, J. Balderud, R. Katebi (ICC, Univ. of Strathclyde, Glasgow, UK)*

SAMPLE: SIMULATION AIDED MISSION PLANNING ENVIRONMENT
*Daniele Cecchi (ISME, Univ. of Pisa, Italy)*
*Stefano Fioravanti (NURC, NATO Undersea Research Centre, Italy)*



NEPTUS – A FRAMEWORK TO SUPPORT A MISSION LIFE CYCLE
*José Pinto, Paulo Sousa Dias, Rui Gonçalves, E. Marques, Gil M. Gonçalves, João Borges Sousa, F. Lobo Pereira (USTL-FEUP, Portugal)*

10:30 – 11:00 Coffee-break

**11:00 - 12:20** [ThB-1] **NETWORKED MARINE VEHICLES**
**Chair: A. Aguiar** (IST/ISR, Portugal)
**ROOM AMPHITHEATRE**

RBF-BASED ADAPTIVE ON-LINE PLANNING OF AUV TEAMS ENVIRONMENTAL MISSIONS
*Andrea Caiti, Andrea Munafò, Riccardo Viviani (ISME, Univ. of Pisa, Italy)*

COORDINATED CONTROL OF MARINE VEHICLES – A SURVEY
*M. Barišić, Z. Vukić, N. Mišković (Univ. Zagreb, Croatia)*

SEAWARE: THE USE OF A PUBLISH/SUBSCRIBE COMMUNICATIONS MIDDLEWARE FOR NETWORKED VEHICLE SYSTEMS
*Eduardo R. B. Marques, Gil M. Gonçalves, João B. Sousa (USTL-FEUP, Portugal)*

**11:00 - 12:20** [ThB-2] **MOTION CONTROL OF SURFACE VESSELS**
**Chair: A. Tiano** *(Univ. Pavia, Italy)*
**ROOM 02.1**

BACKSTEPPING TECHNIQUE FOR THE TRACKING CONTROL OF AN UNDERACTUATED SURFACE VESSEL
*J. Ghommam, F.Mnif, A. Benali, N. Derbel (Lab. de Vision et Robotique, France and Ecole Nationale d'Ingenieurs de Sfax, Tunisia)*

GUIDED DYNAMIC POSITIONING FOR MARINE SURFACE VESSELS
*Morten Breivik, Thor I. Fossen. Jann Strand (NTNU, Norway)*

MOTION CONTROL CONCEPTS FOR TRAJECTORY TRACKING OF FULLY ACTUATED SHIPS
*Morten Breivik,Thor I. Fossen (Centre for Ships and Ocean Structures, NTNU, Norway)*

A PATH-FOLLOWING CONTROLLER FOR THE DELFIMX AUTONOMOUS SURFACE CRAFT
*Pedro Gomes, Carlos Silvestre, António Pascoal, Rita Cunha (IST/ISR, Portugal)*

**11:00 - 12:20** [ThB-3] **COLLISION AVOIDANCE SYSTEMS**
**Chair: Yoshitaka Furukawa** (Kyushu Univ., Fukuoka, Japan)
**ROOM 02.2**

DEVELOPMENT OF AUTOMATIC COLLISION AVOIDANCE SYSTEM USING THE CONCEPT OF BLOCKING AREA
*Katsuro Kijima, Yoshitaka Furukawa, and Hiroshi Ibaragi (Kyushu Univ., Fukuoka, Japan)*



AN ULTRASONIC SENSOR FOR CLOSE RANGE COLLISION AVOIDANCE ON AUVS
*Seán Nolan and Daniel Toal (Mobile and Marine Robotics Research Group, Univ. of Limerick, Ireland)*

A CONTROL STRATEGY FOR FAST OBSTACLE AVOIDANCE IN TROUBLESOME SCENARIOS: APPLICATION IN UNDERWATER CABLE TRACKING
*Javier Antich, Alberto Ortiz, Gabriel Oliver (Univ. Balearic Islands, Spain)*

12:20 – 14:00 Lunch

**14:00– 15:00 PLENARY SESSION**
**ROOM AMPHITHEATRE**

COLLABORATIVE VEHICLES IN FUTURE NAVAL MISSIONS, OBSTACLE DETECTION AND AVOIDANCE
*Anthony Healey* (Naval Postgraduate School, Monterey, CA, USA)

**15:00 - 16:00** [ThC-1] **UNDERWATER POSITIONING**
**Chair: G. Conte** (University Marche, Ancona, Italy)
**ROOM AMPHITHEATRE**

SIMULTANEOUS ACOUSTIC NAVIGATION OF MULTIPLE AUVS
*Aníbal Matos, Nuno Cruz (ISR, Univ. do Porto, Portugal)*

A NONLINEAR FILTER FOR RANGE-ONLY ATTITUDE AND POSITION ESTIMATION
*A. Alcocer, P. Oliveira, A. Pascoal (ISR / IST, Lisboa, Portugal)*

USE OF A RANGEMETER IN ADVANCED AND MODULAR SUBSEA POSITIONING SOLUTIONS
*François Crétollier, Pierre-Yves Morvan (iXSea SAS, France)*

**15:00 - 16:00** [ThC-2] **Marine Systems Modelling**
**Chair: T. Perez** (NTNU, Norway)
**ROOM 02.1**

EFFECTS OF A MUDDY BOTTOM ON THE STRAIGHT-LINE STABILITY
*Guillaume Delefortrie, Marc Vantorre (Ghent Univ., Belgium)*

PROGRESS TOWARDS A METHOD FOR PREDICTING AUV DERIVATIVES
*Ettore A De Barros ( USP, Brasil)*
*António M Pascoal (IST/ISR, Portugal)*
*Elgar De Sa (NIO, Goa, India)*

MODELLING AND CONTROL OF TOP TENSIONED RISERS IN DEEP WATERS
*Anne M. Rustad, Carl M. Larsen, Michael S. Triantafyllou, Franz S. Hover, André H. Jacobsen, Asgeir J. Sørensen (NTNU, Norway and MIT, USA )*

16:00 – 16:20 Coffee break

**16:20 - 17:20** [ThD-1] **Navigation I**
**Chair: L Whitcomb** (Johns Hopkins University, USA)
**ROOM AMPHITHEATRE**

BLUEFIN UUV NAVIGATION REULTS
*Scott Willcox, Jerome Vaganay (Bluefin Robotics Co., Cambridge, MA, USA)*

USBL/INS INTEGRATION TECHNIQUE FOR UNDERWATER VEHICLES
*M. Morgado, P. Oliveira, C. Silvestre, J.F. Vasconcelos (ISR/IST, Portugal)*



MULTI-VEHICLE COOPERATIVE NAVIGATION AND AUTONOMY WITH THE BLUEFIN CADRE SYSTEM
*Scott Willcox, Dani Goldberg, Jerome Vaganay (Bluefin Robotics Co., Cambridge, MA, USA)*
*Joseph A. Curcio (MIT, Cambridge, MA, USA)*

**16:20 - 17:20** [ThD-2] **Ship Manoeuvring and Control I**
**Chair: Tayfun Cimen** (Turkish Naval Research Center Command, Turkey)
**ROOM 02.1**

A SHIP'S MINIMUM TIME APPROACHING CONTROL FOR AUTOMATIC BERTHING USING NEURAL NETWORK AND MODEL PREDICTIVE COMPENSATOR
*Naoki Mizuno (Nagoya Inst. of Tech., Nagoya JAPAN)*
*Makoto Takasu (Nagoya Railroad Co.,Ltd., Nagoya JAPAN),*
*Tadatsugi Okazaki (National Maritime Research Inst., Tokyo JAPAN)*
*Kohei Ohtsu (Tokyo Univ. of Marine Sci. and Tech., Tokyo JAPAN)*

ON-LINE NONLINEAR OPTIMAL MANEUVERING CONTROL OF LARGE TANKERS IN RESTRICTED WATERWAYS
*Tayfun Çimen (ARMERKOM, Istanbul, Türkiye and(ROKETSAN Missiles Industries Inc., Ankara Türkiye)*

THE VALUATION FOR EXTERNAL DISTURBANCES ON SHIP MANEUVERABILITY
*Katsuro Kijima, Yoshitaka Furukawa (Kyushu Univ., Fukuoka, Japan,),*
*Kimihiro Yano (Toyata Motor Co., Toyota, Japan),*
*Ichiro Aoki (Oshima Shipbuilding Co., Ltd., Nagasaki, Japan)*

**16:20 - 17:20** [ThD-3] **CONTROL OF MARINE SYSTEMS**
**Chair: B. Lampe** (University of Rostock, Germany)
**ROOM 02.2**

A CONTROL FOR TRACKING AND STABILIZATION OF AN UNDERACTUATED NON-LINEAR R.C. HOVERCRAFT
*Joaquín Aranda, Dictino Chaos, Sebastián Dormido-Canto, Rocío Muñoz, José Manuel Díaz (UNED, Spain)*

PREDICTIVE CONTROL IN HEAVY-LIFT OFFSHORE MARINE OPERATIONS
*Saverio Messineo, Tristan Perez, Olav Egeland (NTNU, Norway)*

DIGITAL CONTROL WITH GUARANTEED PERFORMANCE UNDER NON-CENTERED STOCHASTIC DISTURBANCES
*V.O. Rybinskii, E.N. Rosenwasser, B.P. Lampe (Univ. Ocean Technology, Russia and Univ. Rostock, Germany)*

SLIDING CONTROLLER FOR SHIP COURSE STEERING
*Mirosław Tomera, Roman Śmierzchalski (Gdynia Maritime University, Poland)*

20:00 – 22:00 Banquet - Oceanarium, Expo98



## Friday, 22nd of September

**8:30 – 9:30 PLENARY SESSION**
**ROOM AMPHITHEATRE**

A SURVEY OF UNDERWATER VEHICLE NAVIGATION: RECENT ADVANCES AND NEW CHALLENGES
*Louis Whitcomb* (Johns Hopkins University, USA)

**9:30 - 10:50** [FrA-1] **MODELING AND CONTROL OF MARINE VEHICLES**
**Chair: Sauro Longhi** (Univ. Polit. delle Marche, Ancona, Italy)
**ROOM AMPHITHEATRE**

PITCH MOTION STABILIZATION BY PROPELLER SPEED CONTROL USING STATISTICAL CONTROLLER DESIGN
*Toshihiko Nakatani (Toyama Nat. College of Maritime Technology, Japan)*
*Mogens Blanke (Tech. Univ. Denmark and CeSOS, NTNU, Norway)*
*Roberto Galeazzi (Tech. Univ. Denmark)*

CONTROL STRUCTURE FOR TRAWL SYSTEMS
*Karl-Johan Reite, Vegar Johansen (SINTEF, Norway)*
*Asgeir J. Sørensen (NTNU, Norway)*

A 4-DOF SIMULINK MODEL OF A COASTAL PATROL VESSEL FOR MANOEUVRING IN WAVES
*Tristan Perez, Andrew Ross, Thor. I. Fossen (NTNU, Norway)*

SELF-COORDINATION TECHNIQUE FOR UNDERWATER MOBILE MANIPULATORS
*Giuseppe Casalino, Alessio Turetta (DIST, Univ. of Genova, Italy)*

CONTROL-ORIENTED MODELLING OF A 2-BODY INTERCONNECTED MARINE SYSTEM
*Mícheál Ó'Catháin, Thor I. Fossen, Bernt J. Leira (NUIM, Ireland and NTNU, Norway)*

**9:30 - 10:50** [FrA-2] **SIMULATORS AND VIRTUAL LABS**
**Chair: Pere Ridao** (Univ. Girona, Spain)
**ROOM 02.1**

REMOTE TRAINING IN AUV CONTROL USING HIL SIMULATORS
*P. Ridao, E. Hernandez, N.Palomeras, M. Carreras (Univ. of Girona, Spain)*

VIRTUAL UNDERWATER LAB: EFFICIENT TOOL FOR SYSTEM INTEGRATION AND UUV CONTROL DEVELOPMENT
*E. Omerdic, J. Riordan, L. Molnar, and D. Toal (Mobile & Marine Robotics Research Centre, Univ. of Limerick, Ireland)*

REAL-TIME SONAR SIMULATOR INTEGRATED WITH VEHICLE CONTROL AND NAVIGATION FOR OCEAN-FLOOR MAPPING APPLICATIONS IN SURVEY-SCALE ENVIRONMENTS
*James Riordan, Edin Omerdic, Levente Molnar, Daniel Toal (Mobile & Marine Robotics Research Centre, Univ. of Limerick, Ireland)*

WAVESIM - WATER VEHICLE SIMULATOR
*António Santos, Aníbal Matos (Ocean Systems Group, Univ. Porto, Portugal)*

**9:30 - 10:50** [FrA-3] **ROV/AUV Development**
**Chair: Elgar de Sa** (NIO, Goa, India)
**ROOM 02.2**

ROMEO ROV ANTARCTIC EXPLOITATION FOR BENTHIC RESEARCH
*R. Bono, Ga. Bruzzone, Gi. Bruzzone, M. Caccia, E. Spirandelli, G. Veruggio (CNR-ISSIA, Italy)*



MECHANICAL DESIGN AND DEVELOPMENT ASPECTS OF A SMALL AUV – MAYA
*R. Madhan, Elgar Desa, S. Prabhudesai, Ehrlich Desa, A. Mascarenhas, Pramod Maurya, G. Navelkar, S. Afzulpurkar, S. Khalap, L.Sebastiao (NIO, India and IST/ISR, Portugal)*

DESIGN OF AGENT-NET BASED CONTROL SYSTEM OF MARINE SYSTEM
*Ikuo Yamamoto (MARITEC, Japan Agency for Marine-Earth Sci. and Tech.)*

UNDERWATER RESEARCH VEHICLES IN EUROPE: THE EUROCEAN DATABASE
*Marta Entradas, Laurent d´Ozouville (EurOcean Office, Lisbon, Portugal), António Pascoal (IST/ISR, Portugal)*

10:50 – 11:20 Coffee-break

**11:20 - 12:20** [FrB-1] **NAVIGATION II**
**Chair: R. Sutton** *(University of Plymouth, UK)*
**ROOM AMPHITHEATER**

SOFT COMPUTING DESIGN OF A MULTI-SENSOR DATA FUSION NAVIGATION SYSTEM FOR AN UNMANNED SURFACE VEHICLE
*T. Xu, J. Chudley, R. Sutton (Univ. Plymouth, UK)*

AN APPROACH TO UNDERWATER SLAM USING MECHANICAL SCANNING SONAR
*G. Conte, S. M. Zanoli, L. Gambella, D. Scaradozzi (Univ. Marche, Italy)*

AUV LOCALIZATION IN STRUCTURED UNDERWATER ENVIRONMENTS USING AN A PRIORI MAP
*David Ribas, José Neira, Pere Ridao, Juan D. Tardós (Univ. Girona, Spain and Univ. Zaragoza, Spain)*

**11:20 - 12:20** [FrB-2] **DYNAMIC POSITIONING I**
**Chair: E. Tannuri** *(Univ. São Paulo, Brasil)*
**ROOM 02.1**

CLARIFICATION OF THE LOW-FREQUENCY MODELLING CONCEPT FOR MARINE CRAFT
*Andrew Ross, Tristan Perez, Thor. I. Fossen (NTNU, Norway)*

STABILITY AND PERFOMANCE OF THE STATION-KEEPING FOR FULLY ACTUATED VESSELS WITH NON-LINEAR PID CONTROL
*A. González, M. García (NAVANTIA, Spain)*
*A. Ollero (Univ. Seville, Spain)*

TOWARDS STATION-KEEPING USING GPI CONTROLLERS
*Jérôme Jouffroy (NTNU, Norway)*

12:20 – 14:00 Lunch-break

**14:00 – 15:00 PLENARY SESSION**
**ROOM AMPHITHEATRE**

TIME DOMAIN MODELS OF MARINE SURFACE VESSELS BASED ON SEAKEEPING COMPUTATIONS
Tristan Perez (*NTNU, Norway*)

**15:00 - 16:00** [FrC-1] **DYNAMIC POSITIONING II**
**Chair: J. Jouffry** *(NTNTU, Norway)*
**ROOM AMPHTHEATRE**

POSITION MOORING BASED ON STRUCTURAL RELIABILITY
*Per Ivar Barth Berntsen, Ole Morten Aamo, Bernt J. Leira (NTNU, Norway)*



ROBUST CONTROL DESIGN BY QFT METHODOLOGY FOR DYNAMIC POSITIONING PROBLEM OF A MOORED FLOATING PLATFORM
*R. Muñoz-Mansilla, J. Aranda, J.M. Díaz, S. Dormido-Canto, D.Chaos (UNED, Spain)*

EXPERIMENTAL SET-UP FOR EXPERIMENTS WITH DYNAMIC POSITIONING SYSTEM
*H. Morishita, E. Tannuri, G. Lago (Univ. of São Paulo, Brazil)*

**15:00 - 16:00** [FrC-2] **SHIP MANOEUVRING AND CONTROL II**
**Chair: J. Giron-Sierra** *(Univ. Complutense de Madrid, Spain)*
**ROOM 02.1**

EXPERIMENTAL STUDY ON THE MANOEUVRING MOTION OF A PLANING BOAT
*Michio Ueno, Tadashi Nimura, Yoshiaki Tsukada, Hideki Miyazaki (National Maritime Research Institute, Japan)*

SHIP COURSE-KEEPING VIA NONLINEAR ADAPTIVE CONTROL SYNTHESIS
Zenon Zwierzewicz (Maritime Univ. of Szczecin, Poland)

EXPERIMENTAL SEAKEEPING CONTROL RESULTS WITH AN AUTONOMOUS SCALED FAST SHIP
*J. Recas, S. Esteban, J.M. Giron-Sierra, J.M. Riola (Univ. Complutense de Madrid, Spain)*

EVOLUTIONARY ALGORITHMS APPLICATION IN A SHIP AUTOPILOT SYSTEM WITH OPTIMAL CONTROLLER
*Piotr Nikonczuk (Tech. Univ. of Szczecin, Poland)*
*Adam Lozowicki (Maritime Univ. of Szczecin, Poland)*

16:00 – 16:30 Coffee break

16:30 – 17:00 Closing session – Room Amphitheatre

**MCMC2006**
**7th Conference on Manoeuvring and Control of Marine Craft**
**Lisbon, 20-22 September 2006**

## Schedule

| Wednesday 20-September-2006 | | | |
|---|---|---|---|
| 8:00 - 17:00 | Registration | | |
| 9:00 - 9:30 | Opening session | | |
| 9:30-10:30 | Plenary Session<br>Marine Robots: Advanced Tools for Marine Science, Dana Yoerger<br>Room: Amphitheatre | | |
| 10:30-11:00 | Coffee-break | | |
| 11:00 - 12:20 | WeA-1<br>Control of Underwater Vehicles I<br>Room: Amph. | WeA-2<br>Power and Propulsion Systems<br>Room: 02.1 | WeA-3<br>Roll Motion Control<br>Room: 02.2 |
| 12:20 - 14:00 | Lunch Break | | |
| 14:00-15:00 | Plenary Session<br>Instruments for Marine Navigation: A Historical Perspective, Malhão Pereira<br>Room: Amphitheatre | | |
| 15:00 - 16:20 | WeB-1<br>Control of Underwater Vehicles II<br>Room: Amph. | WeB-2<br>Vision in Marine Robotics<br>Room: 02.1 | WeB-3<br>Cooperative Ship Control<br>Room: 02.2 |
| 16:20-16:50 | Coffee-break | | |
| 16:50 - 18:10 | WeC-1<br>Formation Control<br>Room: Amph. | WeC-2<br>Fault Detection and Tolerant Systems<br>Room: 02.1 | WeC-3<br>Motion Planning<br>Room: 02.2 |
| 18:15 | Welcome Reception<br>Congress Center IST, Hall 02 | | |

*Notes*



**MCMC2006**
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## Schedule

| Thursday 21-September-2006 | | | |
|---|---|---|---|
| 8:00 - 17:00 | Registration | | |
| 8:30-9:30 | Plenary Session<br>Future Developments and Applications of Marine Robotics, James Bellingham<br>Room: Amphitheatre | | |
| 9:30 - 10:30 | ThA-1<br>Path-Following and Trajectory Tracking<br>Room: Amph. | ThA-2<br>Ship Modelling and Identification<br>Room: 02.1 | ThA-3<br>AUV Mission Planning<br>Room: 02.2 |
| 10:30-11:00 | Coffee-break | | |
| 11:00 - 12:20 | ThB-1<br>Networked marine vehicles<br>Room: Amph. | ThB-2<br>Motion Control of Surface Vessels<br>Room: 02.1 | ThB-3<br>Collision Avoidance Systems<br>Room: 02.2 |
| 12:20 - 14:00 | Lunch Break | | |
| 14:00-15:00 | Plenary Session<br>Collaborative Vehicles in Future Naval Missions, Obstacle Detection and Avoidance, Anthony Healey<br>Room: Amphitheatre | | |
| 15:00 - 16:00 | ThC-1<br>Underwater Positioning<br>Room: Amph. | ThC-2<br>Marine Systems Modelling<br>Room: 02.1 | |
| 16:00-16:20 | Coffee-break | | |
| 16:20 - 17:20 | ThD-1<br>Navigation I<br>Room: Amph. | ThD-2<br>Ship Manoeuvring and Control I<br>Room: 02.1 | ThD-3<br>Control of Marine Systems<br>Room: 02.2 |
| 20:00 | Banquet - Oceanarium, Expo98 | | |

*Notes*

**MCMC2006**
**7th Conference on Manoeuvring and Control of Marine Craft**
**Lisbon, 20-22 September 2006**

## Schedule

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|---|---|---|---|
| **Friday 22-September-2006** | | | |
| 8:00 -17:00 | Registration | | |
| 8:30-9:30 | Plenary Session<br>A Survey of Underwater Vehicle Navigation: Recent Advances and New Challenges<br>Louis Whitcomb<br>Room: Amphitheatre | | |
| 9:30 - 10:50 | FrA-1<br>Modelling and Control of Marine Vehicles<br>Room: Amph. | FrA-2<br>Simulators and Virtual Labs<br>Room: 02.1 | FrA-3<br>ROV/AUV Development<br>Room: 02.2 |
| 10:50-11:20 | Coffee-break | | |
| 11:20 - 12:20 | FrB-1<br>Navigation II<br>Room: Amph. | FrB-2<br>Dynamic Positioning I<br>Room: 02.1 | |
| 12:20 - 14:00 | Lunch Break | | |
| 14:00-15:00 | Plenary Session<br>Time Domain Models of Marine Surface Vessels Based on Seakeeping Computations, Tristan Perez<br>Room: Amphitheatre | | |
| 15:00 - 16:00 | FrC-1<br>Dynamic Positioning II<br>Room: Amph. | FrC-2<br>Ship Manoeuvring and Control II<br>Room: 02.1 | |
| 16:00-16:30 | Coffee-break | | |
| 16:30-17:00 | Closing cerimony | | |

*Notes*