

# **9th IFAC Conference on Control Applications in Marine Systems 2013**

**Osaka, Japan  
17 - 20 September 2013**

**Editors:**

**Kazuhiko Hasegawa**

**ISBN: 978-1-63266-292-7**

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



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# Content List of 9th IFAC Conference on Control Applications in Marine Systems

## Technical Program for Tuesday September 17, 2013

|  |   |
|--|---|
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| Blaich, Michael  | Univ. of Applied Sciences Konstanz      |
| Wirtensohn, Stefan   | Univ. of Applied Sciences Konstanz      |
| Oswald, Markus   | Univ. of Applied Sciences Konstanz      |
| Hamburger, Oliver  | Univ. of Applied Sciences Konstanz      |
| Reuter, Johannes   | Univ. of Applied Sciences               |
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| Chaos, Dictino   | UNED                                    |
| Muñoz-Mansilla, Rocío  | UNED                                    |
| Moreno-Salinas, David  | UNED                                    |
| Aranda, Joaquin  | Univ. Nacional de Educación a Distancia |
| 15:40-16:00  | TuAT1.3                                 |
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| Kimura, Ryota  | Osaka Univ.                             |
| Ukita, Masahiro  | Osaka Univ.                             |
| Kamezuka, Keiko  | Osaka Univ.                             |
| Kato, Naomi  | Osaka Univ.                             |
| Senga, Hidetaka  | Osaka Univ.                             |
| Suzuki, Hiroyoshi  | Osaka Univ.                             |
| Choyekh, Mahdi   | Osaka Univ.                             |
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| CLEMENT, Benoît  | ENSTA Bretagne                          |
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| Ahmed, Yaseen Adnan  | Osaka Univ.                             |
| Hasegawa, Kazuhiko   | Osaka Univ.                             |
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| Veremey, Evgeny  | Saint-Petersburg State Univ.            |
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| Sotnikova, Margarita   | Saint-Petersburg State Univ.            |
| Veremey, Evgeny  | Saint-Petersburg State Univ.            |
| 15:40-16:00  | TuAT2.3                                 |
| <i>Fuel Optimal Thrust Allocation in Dynamic Positioning</i> , pp. 43-48.  |   |
| Rindarøy, Martin   | Norwegian Univ. of Science and Tech.    |
| Johansen, Tor Arne   | Norwegian Univ. of Science and Tech.    |
| 16:00-16:20  | TuAT2.4                                 |
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| Skjetne, Roger   | Norwegian Univ. of Science And Tech.    |
| Kjerstad, Øivind Kåre  | Norwegian Univ. of Science and Tech.    |
| 16:20-16:40  | TuAT2.5                                 |
| <i>Experimental Results of Discrete Time Variable Structure Control for Dynamic Positioning of Marine Surface Vessels</i> , pp. 55-60. |   |
| Raspa, Paolo   | Univ. Pol. delle Marche                 |
| Benetazzo, Flavia  | Univ. Pol. delle Marche                 |

Longhi, Sauro  
Ippoliti, Gianluca  
Soerensen, Asgeir

Univ. Pol. delle Marche  
Univ. Pol. delle Marche  
Norwegian Univ. of Science and Tech.

**Technical Program for Wednesday September 18, 2013**

|   |   |
|---|---|
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| Wu, Jun   | Central South Univ.                           |
| Peng, Hui   | Central South Univ.                           |
| Ohtsu, Kohei  | Tokyo Univ. of Marine Science and Tech. Japan |
| Kitagawa, Genshiro  | The Inst. of Statistical Mathematics          |
| ODA, HIROYUKI   | Akishima Lab. (Mitsui Zosen) Inc.             |
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| <i>Design and Evaluation of Simple Ship's Automatic Maneuvering System Using Sliding Mode Controller</i> , pp. 67-72.                         |   |
| Mizuno, Naoki   | Nagoya Inst. of Tech.                         |
| Matsumoto, Satoru   | Nagoya Inst. of Tech.                         |
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| <i>Speed Constraints Handling in USV Swarm Path-Following Frameworks</i> , pp. 73-78.   |   |
| Bibuli, Marco   | CNR-ISSIA                                     |
| Bruzzone, Gabriele  | CNR-ISSIA                                     |
| Caccia, Massimo   | CNR-ISSIA                                     |
| Gasparri, Andrea  | Univ. of Roma Tre                             |
| Priolo, Attilio   | Univ. Roma Tre                                |
| Zereik, Enrica  | CNR - ISSIA                                   |
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| <i>Speed-Varying Path Following for Underactuated Marine Craft</i> , pp. 79-84.   |   |
| Peymani, Ehsan  | Norwegian Univ. of Science and Tech.          |
| Fossen, Thor I.   | NTNU  |
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| <i>Path Following of Underactuated Surface Vessels in Presence of Unknown Constant Environmental Forces: Preliminary Results</i> , pp. 85-90. |   |
| Caharija, Walter  | NTNU  |
| Pettersen, Kristin Y.   | Norwegian Univ. of Science and Tech.          |
| Gravdahl, Jan Tommy   | Norwegian Univ. of Science & Tech.            |
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| <i>New Collision Alarm Algorithm Using Obstacle Zone by Target (OZT)</i> , pp. 91-96.   |   |
| FUKUTO, JUNJI   | NMRI JAPAN                                    |
| IMAZU, HAYAMA   | Tokyo Univ. of Marine Science and Tech.       |
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| <i>A User Test of Automatic Navigational Intention Exchange Support System Using an Intelligent Ship-Handling Simulator</i> , pp. 97-102.     |   |
| miyake, rina  | National Maritime Res. Inst.                  |
| FUKUTO, JUNJI   | NMRI JAPAN                                    |
| NIWA, Yasuyuki  | National Maritime Res. Inst.                  |
| MINAMI, MAKIKO  | Japan Transport Safety Board                  |
| 11:00-11:20   | WeAT2.3                                       |
| <i>Towards Marine Collision Avoidance Based on Automatic Route Exchange</i> , pp. 103-107.  |   |
| Hornauer, Sascha  | Carl von Ossietzky Univ. Oldenburg            |
| Hahn, Axel  | Carl von Ossietzky Univ. Oldenburg            |
| 11:20-11:40   | WeAT2.4                                       |
| <i>Ship Override Control for Uncoordinated Anti-Collision Action Using Trial Manoeuvre</i> , pp. 108-113.                                     |   |
| Zhuo, Yongqiang   | Guangdong Ocean Univ.                         |
| Hasegawa, Kazuhiko  | Osaka Univ.                                   |
| <b>WeBT1</b>  | Room T1                                       |

**Session We2.1 (Regular Session)**

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| Zereik, Enrica  | CNR - ISSIA                          |
| Bibuli, Marco   | CNR-ISSIA                            |
| Bruzzzone, Gabriele   | CNR-ISSIA                            |
| Caccia, Massimo   | CNR-ISSIA                            |
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| <i>Path Following of Marine Surface Vessels Using Bow and Aft Rudders in Wave Fields</i> , pp. 120-125.     |                                      |
| Feng, Peiyuan   | Shanghai Jiao Tong Univ.             |
| Sun, Jing   | Univ. of Michigan                    |
| Ma, Ning  | Shanghai Jiao Tong Univ.             |
| 13:40-14:00   | WeBT1.3                              |
| <i>Experiment on Track-Keeping Performance Using a Free Running Model Ship</i> , pp. 126-131.               |                                      |
| im, namkyun   | mokpo national maritime Univ.        |
| Tran, Van-Luong   | Vietnam Maritime Univ.               |
| Le, Thanh-Dat   | Mokpo National Maritime Univ.        |
| 14:00-14:20   | WeBT1.4                              |
| <i>Continuous Curvature Path Planning Using Voronoi Diagrams and Fermat's Spirals</i> , pp. 132-137.        |                                      |
| Candeloro, Mauro  | NTNU                                 |
| Lekkas, Anastasios  | Norwegian Univ. of Science and Tech. |
| Soerensen, Asgeir   | Norwegian Univ. of Science and Tech. |
| Fossen, Thor I.   | NTNU                                 |
| 14:20-14:40   | WeBT1.5                              |
| <i>Methodology of Vessel's Route Program Motion on the Basis of Sigma Function</i> , pp. 138-143.           |                                      |
| Mironenko, Alexandr   | Admiral Ushakov State Maritime Univ. |
| 14:40-15:00   | WeBT1.6                              |
| <i>Full-State Manoeuvre Planning System for Marine Vehicles</i> , pp. 144-149.                              |                                      |
| Kurowski, Martin  | Univ. of Rostock                     |
| Köckritz, Oliver  | Jade Univ. of Applied Sciences       |
| Korte, Holger   | Jade - Univ. of Applied Sciences     |

**WeBT2**

Room T2

**Session We2.2 (Regular Session)**

|  |   |
|--|---|
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| Theisen, Lukas Roy Svane   | Tech. Univ. of Denmark                        |
| Galeazzi, Roberto  | Tech. Univ. of Denmark                        |
| Blanke, Mogens   | Tech. Univ. of Denmark                        |
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| <i>Unit Commitment of Generator Sets During Dynamic Positioning Operation Based on Consequence Simulation</i> , pp. 156-160. |   |
| Bø, Torstein Ingebrigtsen  | Norwegian Univ. of Science and Tech.          |
| Johansen, Tor Arne   | Norwegian Univ. of Science and Tech.          |
| Mathiesen, Eirik   | Kongsberg Maritime                            |
| 13:40-14:00  | WeBT2.3                                       |
| <i>Four-Quadrant Propeller Modeling: A Low-Order Harmonic Approximation</i> , pp. 161-166.                                   |   |
| Häusler, Andreas Johannes  | Inst. Superior Técnico                        |
| Saccon, Alessandro   | Eindhoven Univ. of Tech.                      |
| Hauser, John   | Univ. of Colorado at Boulder                  |
| Pascoal, Antonio M.  | ISR-Inst. Superior Tecnico                    |
| Aguiar, A. Pedro   | Faculty of Engineering, Univ. of Porto (FEUP) |
| 14:00-14:20  | WeBT2.4                                       |
| <i>Performance Evaluation of an Underwater Vehicle Equipped with a Collective and Cyclic Pitch Propeller</i> , pp. 167-172.  |   |
| Nguyen, Hung Duc   | Univ. of Tasmania / Australian Maritime Coll. |
| Niyomka, Poowadol  | Australian maritime Coll.                     |
| Bose, Neil   | AMC, Univ. of Tasmania                        |
| Binns, Jonathan  | Univ. of Tasmania / Australian Maritime Coll. |

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14:20-14:40

WeBT2.5

*Influence of Propulsion System Configuration on the Manoeuvring Performances of a Surface Twin-Screw Ship*, pp. 173-178.

Mauro, Salvatore

CNR-INSEAN - Italian National Ship Model Basin

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14:40-15:00

WeBT2.6

*Experiments to Determine Thruster Design Parameters of a Moored Floating Platform*, pp. 179-184.

SC, Sajjan

Indian Inst. of Tech. Madras

Sankunny, Surendran

Indian Inst. of Tech. Madras

Lee, Seung Keon

Dept. of Naval Architecture and Ocean Engineering, Pusan  
Nationa

**Technical Program for Thursday September 19, 2013**

| <b>ThAT1</b>  |  | Room T1  |
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| <i>Analysis of Identification Methods Applied to Free Model Tests of the Pirajuba AUV</i> , pp. 185-190.  |  |  |
| Dantas, João Lucas Dozzi  |  | Pol. School of Univ. of São Paulo                  |
| Caetano, William da Silva   |  | Pol. School of Univ. of São Paulo                  |
| Vale, Rodrigo Telles da Silva   |  | Univ. of São Paulo                                 |
| de Barros, Ettore   |  | Univ. of Sao Paulo                                 |
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| Oskin, Dmitry A.  |  | Maritime State Univ. Vladivostok, Russia           |
| Dyda, Alexander   |  | Maritime State Univ.                               |
| Markin, Vasily  |  | Maritime State Univ.                               |
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| Suzuki, Hiroyoshi   |  | Osaka Univ.  |
| Yoshida, Hiroshi  |  | JAMSTEC  |
| Inoue, Tomoya   |  | JAMSTEC  |
| Watanabe, Yoshitaka   |  | JAMSTEC  |
| Sakaguchi, Junki  |  | DENSO  |
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| Hassani, Vahid  |  | The Norwegian Marine Tech. Res. Inst. (MARINTEK)   |
| Soerensen, Asgeir   |  | Norwegian Univ. of Science and Tech.               |
| Pascoal, Antonio M.   |  | ISR-Inst. Superior Tecnico                         |
| 11:40-12:00   |  | ThAT1.5  |
| <i>A Globally K-Exponentially Stable Nonlinear Observer for the Wave Encounter Frequency</i> , pp. 209-214.   |  |  |
| Belleter, Dennis  |  | Norwegian Univ. of Science and Tech.               |
| Breu, Dominik   |  | NTNU   |
| Fossen, Thor I.   |  | NTNU   |
| Nijmeijer, Hendrik  |  | Eindhoven Univ. of Tech.                           |
| <b>ThAT2</b>  |  | Room T2  |
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| Glotzbach, Thomas   |  | Tech. Univ. Ilmenau                                |
| Moreno-Salinas, David   |  | UNED   |
| Pascoal, Antonio M.   |  | ISR-Inst. Superior Tecnico                         |
| Aranda, Joaquin   |  | Univ. Nacional de Educación a Distancia            |
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| Vale, Rodrigo Telles da Silva   |  | Univ. of São Paulo                                 |
| de Barros, Ettore   |  | Univ. of Sao Paulo                                 |
| Martins, Thiago de Castro   |  | Univ. of Sao Paulo                                 |
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| <i>Observability Analysis of 2D Single-Beacon Navigation in the Presence of Constant Currents for Two Classes of Maneuvers</i> , pp. 227-232.           |  |  |
| Crasta, Naveena   |  | TU Ilmenau   |
| Bayat, Mohammadreza   |  | Tech. Univ. of Lisbon, Inst. Superior Técnico(IST) |
| Aguiar, A. Pedro  |  | Faculty of Engineering, Univ. of Porto (FEUP)      |
| Pascoal, Antonio M.   |  | ISR-Inst. Superior Tecnico                         |
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| <i>Underwater Target Positioning with a Single Acoustic Sensor</i> , pp. 233-238.   |  |  |



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|-----------------------|---|
| Moreno-Salinas, David | UNED                                    |
| Pascoal, Antonio M.   | ISR-Inst. Superior Tecnico              |
| Aranda, Joaquin       | Univ. Nacional de Educación a Distancia |

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| 11:40-12:00 | ThAT2.5 |
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*Magnetic Navigation and Tracking of Underwater Vehicles*, pp. 239-244.

|                     |                            |
|---------------------|----------------------------|
| Teixeira, Francisco | Univ. of Aveiro            |
| Pascoal, Antonio M. | ISR-Inst. Superior Tecnico |

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| <b>ThBT1</b>                           | Room T1 |
| <b>Session Th2.1 (Regular Session)</b> |         |

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|-------------|---------|
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*A Quaternion-Based LOS Guidance Scheme for Path Following of AUVs*, pp. 245-250.

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| Lekkas, Anastasios | Norwegian Univ. of Science and Tech. |
| Fossen, Thor I.    | NTNU                                 |

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| 13:20-13:40 | ThBT1.2 |
|-------------|---------|

*Trajectory Tracking Motion Control System for Observation Class ROVs*, pp. 251-256.

|                              |   |
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| de Almeida Fernandes, Daniel | Norwegian Univ. of Science and Tech. (NTNU) |
| Soerensen, Asgeir            | Norwegian Univ. of Science and Tech.        |
| Donha, Decio Crisol          | Univ. de Sao Paulo                          |

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| 13:40-14:00 | ThBT1.3 |
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*Adaptive VSS Control with Deformable Sliding Surfaces for Underwater Robot Manipulator Drives*, pp. 257-261.

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| Markin, Vasily   | Maritime State Univ.                     |
| Dyda, Alexander  | Maritime State Univ.                     |
| Oskin, Dmitry A. | Maritime State Univ. Vladivostok, Russia |

|             |         |
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| 14:00-14:20 | ThBT1.4 |
|-------------|---------|

*A Packet Loss Compliant Logic-Based Communication Algorithm for Cooperative Path-Following Control*, pp. 262-267.

|                     |   |
|---------------------|---|
| Rego, Francisco     | ISR/IST                                       |
| Aguiar, A. Pedro    | Faculty of Engineering, Univ. of Porto (FEUP) |
| Pascoal, Antonio M. | ISR-Inst. Superior Tecnico                    |

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| 14:20-14:40 | ThBT1.5 |
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*Cooperative Control Applied to DP Systems - Numerical Analysis*, pp. 268-273.

|                                       |   |
|---------------------------------------|---|
| Queiroz Filho, Asdrubal do Nascimento | Fundação de Apoio à Univ. de São Paulo CNPJ68314830/0001- |
| Tannuri, Eduardo Aoun                 | Univ. of Sao Paulo USP                                    |

|             |         |
|-------------|---------|
| 14:40-15:00 | ThBT1.6 |
|-------------|---------|

*Observer-Lagrangian-Based Controller Applied to Two Dynamically Controlled Vessels*, pp. 274-279.

|                          |                                       |
|--------------------------|---------------------------------------|
| Moratelli, Lázaro, Jr.   | Univ. of São Paulo                    |
| Ramos Marangoni, Rafael  | Pol. School of the Univ. of São Paulo |
| Morishita, Helio Mitio   | Univ. of São Paulo                    |
| Santos Martinez, Rodrigo | Pol. School of Univ. of São Paulo     |

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| <b>ThBT2</b>                           | Room T2 |
| <b>Session Th2.2 (Regular Session)</b> |         |

|             |         |
|-------------|---------|
| 13:00-13:20 | ThBT2.1 |
|-------------|---------|

*Integration Filter for APS, DVL, IMU and Pressure Gauge for Underwater Vehicles*, pp. 280-285.

|                   |                                      |
|-------------------|--------------------------------------|
| Dukan, Fredrik    | Norwegian Univ. of Science and Tech. |
| Soerensen, Asgeir | Norwegian Univ. of Science and Tech. |

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|-------------|---------|
| 13:20-13:40 | ThBT2.2 |
|-------------|---------|

*A Comparison of G2o Graph SLAM and EKF Pose Based SLAM with Bathymetry Grids*, pp. 286-291.

|                     |                                 |
|---------------------|---------------------------------|
| Palomer, Albert     | Univ. de Girona                 |
| Ridao, Pere         | Univ. of Girona VAT:ESQ6750002E |
| Ribas, David        | Univ. of Girona                 |
| Mallios, Angelos    | Univ. de Girona                 |
| Vallicrosa, Guillem | Univ. de Girona                 |

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| 13:40-14:00 | ThBT2.3 |
|-------------|---------|

*Preliminary Results on the Active Pose Estimation of Underwater Vehicles from Range Measurements*, pp. 292-297.

|                        |                               |
|------------------------|-------------------------------|
| Parlangeli, Gianfranco | Univ. degli studi del Salento |
|------------------------|-------------------------------|

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| Indiveri, Giovanni   | Univ. of Salento                               |
| 14:00-14:20  | ThBT2.4  |
| <i>Heave Motion Estimation on a Craft Using a Strapdown Inertial Measurement Unit</i> , pp. 298-303.                                 |  |
| Auestad, Øyvind, F.  | Norwegian Univ. of Science & Tech. Umoe Mandal |
| Gravdahl, Jan Tommy  | Norwegian Univ. of Science & Tech.             |
| Fossen, Thor I.  | NTNU   |
| 14:20-14:40  | ThBT2.5  |
| <i>Monitoring of Seaweed Bed by a Surface Piercing Autonomous Underwater Vehicle with a Sidescan Sonar</i> , pp. 304-309.            |  |
| Kato, Naomi  | Osaka Univ.                                    |
| Shoji, Yoshiyuki   | Osaka Univ.                                    |
| Senga, Hidetaka  | Osaka Univ.                                    |
| 14:40-15:00  | ThBT2.6  |
| <i>Real-Time 3D Reconstruction of Underwater Sea-Ice Topography by Observations from a Mobile Robot in the Arctic</i> , pp. 310-315. |  |
| Jørgensen, Ulrik   | Norwegian Univ. of Science and Tech.           |
| Skjetne, Roger   | Norwegian Univ. of Science And Tech.           |

|  |   |
|--|---|
| <b>ThPT3</b>   | Room T3   |
| <b>Plenary Talk Th.P2 (Plenary Session)</b>  |   |
| 15:30-16:30  | ThPT3.1   |
| <i>Energy-Based Motion Control of Marine Vehicles Using Interconnection and Damping Assignment Passivity-Based Control - a Survey</i> , pp. 316-327. |   |
| Perez, Tristan   | The Univ. of Newcastle  |
| Donaire, Alejandro   | CDSC - Centre for Complex Dynamic Systems and Control,<br>TheUniver |
| Renton, Christopher  | Univ. of Newcastle  |
| Valentinis, Francis  | Defence Science and Tech. Organisation                              |

**Technical Program for Friday September 20, 2013**

| <b>FrAT1</b>  |  | Room T1                            |
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| <i>Energy-Based Nonlinear Control of Ship Roll Gyro-Stabiliser with Precession Angle Constraints</i> , pp. 328-333.   |  |                                    |
| Donaire, Alejandro  | CDSC - Centre for Complex Dynamic Systems and Control,     | TheUniver                          |
| Perez, Tristan  |  | The Univ. of Newcastle             |
| 10:40-11:00   |  | FrAT1.2                            |
| <i>Advanced Statistical Analysis with Guaranteed Estimation of Current Performance for Sampled-Data Systems with Delay and Generalized Higher Order Hold</i> , pp. 334-339. |  |                                    |
| Rybinskii, Vladislav  |  | SMTU                               |
| Rosenwasser, Efim N.  | Marine Tech. Univ. of Saint Petersburg                     |                                    |
| Lampe, Bernhard P.  |  | Univ. of Rostock                   |
| 11:00-11:20   |  | FrAT1.3                            |
| <i>Modelling of Drag Forces on a Closed Flexible Fish Cage</i> , pp. 340-345.   |  |                                    |
| Strand, Ida Marlen  | Centre for Autonomous Marine Operations and Systems (AMOS) | NTNU                               |
| Soerensen, Asgeir   | Norwegian Univ. of Science and Tech.                       |                                    |
| Lader, Paal   | SINTEF Fisheries and Aquaculture                           |                                    |
| Volent, Zsolt   | SINTEF Fisheries and Aquaculture                           |                                    |
| 11:20-11:40   |  | FrAT1.4                            |
| <i>Exhaust Gas Recirculation Control for Large Diesel Engines - Achievable Performance with SISO Design</i> , pp. 346-351.  |  |                                    |
| Hansen, Jakob Mahler  |  | Tech. Univ. of Denmark             |
| Blanke, Mogens  |  | Tech. Univ. of Denmark             |
| Niemann, Henrik   |  | Tech. Univ. of Denmark             |
| Vejlgaard-Laursen, Morten   |  | MAN Diesel & Turbo                 |
| 11:40-12:00   |  | FrAT1.5                            |
| <i>Algorithm for Automatic Acoustic Detection of Ship and Marine Mammals</i> , pp. 352-355.   |  |                                    |
| Sakurada, Akiko   |  | Osaka Univ.                        |
| Akamatsu, Tomonari  | National Res. Inst. of Fisheries Engineering, Fisheries    |                                    |
| Umeda, Naoya  |  | Osaka Univ.                        |
| <b>FrAT2</b>  |  | Room T2                            |
| <b>Session Fr1.2 (Regular Session)</b>  |  |                                    |
| 10:20-10:40   |  | FrAT2.1                            |
| <i>Actuator Fault Detection System for a Remotely Operated Vehicle</i> , pp. 356-361.   |  |                                    |
| FREDDI, ALESSANDRO  |  | Univ. Pol. delle Marche            |
| Longhi, Sauro   |  | Univ. Pol. delle Marche            |
| Monteriù, Andrea  |  | Univ. Pol. delle Marche            |
| 10:40-11:00   |  | FrAT2.2                            |
| <i>Towards an Implementation for Offshore Operation Simulations</i> , pp. 362-367.  |  |                                    |
| Richter, Jan  |  | Jade Univ. of Applied Sciences     |
| Korte, Holger   |  | Jade - Univ. of Applied Sciences   |
| 11:00-11:20   |  | FrAT2.3                            |
| <i>Risk Assessment of Human Machine Interaction for Control and Navigation Systems of Marine Vessels</i> , pp. 368-373.   |  |                                    |
| Hahn, Axel  |  | Carl von Ossietzky Univ. Oldenburg |
| 11:20-11:40   |  | FrAT2.4                            |
| <i>VIV Analysis of a Cantilevered Pipe Discharging Fluid with a Nozzle in the Sea</i> , pp. 374-379.  |  |                                    |
| meng, shuai   |  | Kyushu Univ.                       |
| 11:40-12:00   |  | FrAT2.5                            |
| <i>Modelling for Control of Exhaust Gas Recirculation on Large Diesel Engines</i> , pp. 380-385.  |  |                                    |
| Hansen, Jakob Mahler  |  | Tech. Univ. of Denmark             |
| Zander, Claes-Göran   |  | MAN Diesel & Turbo                 |
| Pedersen, Nicolai   |  | Tech. Univ. of Denmark             |
| Blanke, Mogens  |  | Tech. Univ. of Denmark             |

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*Launch of Robotic Fish to the Space: Development of Autonomous Cleaning Robot in the International Space Station*, pp. 386-391.

Mizui, Masahiko

Kyushu Kyouritu Univ.

Yamamoto, Ikuo

Nagasaki Univ.

Oka, Taishi

The Univ. of Kitakyushu