

## Content List of 2012 IFAC Workshop on Automatic Control in Offshore Oil and Gas Production

### Technical Program for Thursday May 31, 2012

| ThPI1  | EL5                                  |
|--|--------------------------------------|
| <b>Invited Industry Presentations</b> (Plenary Session)  |                                      |
| 08:40-09:25  | ThPI1.2                              |
| <i>The Role of Automation in Future Offshore Operations*</i> .   |                                      |
| Hersvik, Karl Johnny   | Statoil ASA                          |
| 09:25-10:10  | ThPI1.3                              |
| <i>All Subsea Solutions, Technology to Move the Platform to the Seabed*</i> .  |                                      |
| Johansen, Christina  | FMC Kongsberg Subsea AS              |
| ThA1   | EL5                                  |
| <b>Reservoir Optimization</b> (Regular Session)  |                                      |
| 10:30-10:50  | ThA1.1                               |
| <i>Estimation of Optimal Well Controls Using the Augmented Lagrangian Function with Approximate Derivatives</i> , pp. 1-6.   |                                      |
| Do, Sy   | Univ. of Tulsa                       |
| Forouzanfar, Fahim   | Univ. of Tulsa                       |
| Reynolds, Albert   | Univ. of Tulsa                       |
| 10:50-11:10  | ThA1.2                               |
| <i>Real-Time Production Optimization and Reservoir Management at the IO Center</i> , pp. 7-12.   |                                      |
| Foss, Bjarne   | Norwegian Univ. of Science & Tech.   |
| 11:10-11:30  | ThA1.3                               |
| <i>The Optimization Problem in Model-Reduced Gradient-Based History Matching</i> , pp. 13-18.  |                                      |
| Szklarz, Slawomir  | Delft Univ. of Tech.                 |
| Rojas, Marielba  | Delft Univ. of Tech.                 |
| Kaleta, Malgorzata   | Shell Global Solutions International |
| 11:30-11:50  | ThA1.4                               |
| <i>Integrated Capacitance-Resistance Model for Characterizing Waterflooded Reservoirs</i> , pp. 19-24.   |                                      |
| Kim, Jong Suk  | Univ. of Texas at Austin             |
| Lake, Larry W.   | Univ. of Texas                       |
| Edgar, Thomas F.   | Univ. of Texas at Austin             |
| 11:50-12:10  | ThA1.5                               |
| <i>Control Performance Monitoring of Excessive Oscillations of an Offshore Production Facility</i> , pp. 25-32.  |                                      |
| Zheng, Yingying  | Univ. of Southern California         |
| Qin, S. Joe  | Univ. of Southern California         |
| Barham, Michael  | Chevron                              |
| ThA2   | EL6                                  |
| <b>Robotics and Autonomous Systems</b> (Regular Session)   |                                      |
| 10:30-10:50  | ThA2.1                               |
| <i>RoboGasInspector – a Mobile Robotic System for Remote Leak Sensing and Localization in Large Industrial Environments: Overview and First Results</i> , pp. 33-38. |                                      |
| Soldan, Samuel   | Univ. of Kassel                      |
| Bonow, Gero  | Univ. of Kassel                      |
| Kroll, Andreas   | Univ. of Kassel                      |
| 10:50-11:10  | ThA2.2                               |
| <i>A Learning Camera Platform for Remote Operations with</i>   |                                      |

### *Industrial Manipulators*, pp. 39-46.

| Fjerdigen, Sigurd Aksnes   | SINTEF ICT                              |
|--|---|
| Bjerkeng, Magnus   | NTNU                                    |
| Transeth, Aksel Andreas  | SINTEF ICT                              |
| Kyrkjebø, Erik   | Norwegian Univ. of Science and Tech.    |
| Røyrvøy, Anders  | Statoil ASA                             |
| 11:10-11:30  | ThA2.3                                  |
| <i>A Step-Wise Approach to Oil and Gas Robotics</i> , pp. 47-52.   |   |
| Anisi, David A.  | ABB                                     |
| Skourup, Charlotte   | ABB                                     |
| 11:30-11:50  | ThA2.4                                  |
| <i>CAD-Based Training of an Expert System and a Hidden Markov Model for Obstacle Detection in an Industrial Robot Environment</i> , pp. 53-58. |   |
| Kaldestad, Knut Berg   | Univ. of Agder                          |
| Hovland, Geir  | Univ. of Agder                          |
| Anisi, David A.  | ABB                                     |
| 11:50-12:10  | ThA2.5                                  |
| <i>Remote Calibration and Trajectory Replanning for Robot Manipulators Operating in Unstructured Environments</i> , pp. 59-65.                 |   |
| Leite, Antonio C.  | Federal Univ. of Rio de Janeiro         |
| Lizarralde, Fernando   | Federal Univ. of Rio de Janeiro         |
| From, Pål Johan  | Norwegian Univ. of Life Sciences        |
| Costa, Ramon R.  | COPPE - Federal Univ. of Rio de Janeiro |
| Hsu, Liu   | COPPE - Federal Univ. of Rio de Janeiro |
| ThB1   | EL5                                     |
| <b>Directional Drilling</b> (Regular Session)  |   |
| 13:30-13:50  | ThB1.1                                  |
| <i>Rotary Steerable Directional Drilling Stick/Slip Mitigation Control</i> , pp. 66-71.  |   |
| Bayliss, Martin Thomas   | Schlumberger ltd                        |
| Panchal, Neilkunal   | Cranfield Univ.                         |
| Whidborne, James F.  | Cranfield Univ.                         |
| 13:50-14:10  | ThB1.2                                  |
| <i>L1 Adaptive Control for Directional Drilling Systems</i> , pp. 72-77.   |   |
| Sun, Hui   | Univ. of Illinois at Urbana-Champaign   |
| Li, Zhiyuan  | UIUC                                    |
| Hovakimyan, Naira  | UIUC                                    |
| Basar, Tamer   | Univ. of Illinois at Urbana-Champaign   |
| Downton, Geoff   | Schlumberger                            |
| 14:10-14:30  | ThB1.3                                  |
| <i>Vector Based Kinematic Closed-Loop Attitude Control-System for Directional Drilling</i> , pp. 78-83.  |   |
| Panchal, Neilkunal   | Cranfield Univ.                         |
| Bayliss, Martin Thomas   | Schlumberger ltd                        |
| Whidborne, James F.  | Cranfield Univ.                         |
| 14:30-14:50  | ThB1.4                                  |
| <i>A Hybrid Approach to Closed-Loop Directional Drilling Control Using Rotary Steerable Systems</i> , pp. 84-89.                               |   |
| Matheus, Justo   | Schlumberger                            |

|  |  |
|--|--|
| Ignova, Maja   | Schlumberger                                 |
| Hornblower, Peter John   | Schlumberger                                 |
| 14:50-15:10  | ThB1.5                                       |
| <i>An Adaptive PID Switching Controller for Pressure Regulation in Drilling</i> , pp. 90-94. |  |
| Siahaan, Hardy B.  | International Res. Inst. of Stavanger (IRIS) |
| Jin, Huiyu   | Univ. of Science and Tech. of China          |
| Safonov, Michael G.  | Univ. of Southern California                 |

|  |     |
|--|-----|
| <b>ThB2</b>                                    | EL6 |
| <b>Slugging and Gas Lift (Regular Session)</b> |     |

|   |                                 |
|---|---------------------------------|
| 13:30-13:50   | ThB2.1                          |
| <i>Stabilizing Gas-Lift Well Dynamics with Free Operating Point</i> , pp. 95-100. |                                 |
| Plucenio, Agustinho   | Univ. Federal de Santa Catarina |
| Ganzaroli, Cleber A.  | Federal Univ. of Santa Catarina |
| Pagano, Daniel Juan   | Federal Univ. of Santa Catarina |

|  |                                      |
|--|--------------------------------------|
| 13:50-14:10  | ThB2.2                               |
| <i>Controllability Analysis of Severe Slugging in Well-Pipeline-Riser Systems</i> , pp. 101-108. |                                      |
| Jahanshahi, Esmaeil  | Norwegian Univ. of Science and Tech. |
| Skogestad, Sigurd  | Norwegian Univ. of Science & Tech.   |
| Hoel Helgesen, Anette  | BP Norge AS                          |

|  |                                |
|--|--------------------------------|
| 14:10-14:30  | ThB2.3                         |
| <i>Model-Based Control of Slugging: Advances and Challenges</i> , pp. 109-115. |                                |
| Di Meglio, Florent   | UCSD                           |
| Kaasa, Glenn-Ole   | Statoil, Res. Centre Porsgrunn |
| Petit, Nicolas   | MINES ParisTech                |
| Alstad, Vidar  | Norsk Hydro ASA                |

|   |                 |
|---|-----------------|
| 14:30-14:50   | ThB2.4          |
| <i>Gas Injection for Hydrodynamic Slug Control</i> , pp. 116-121. |                 |
| Krima, Hazem  | Cranfield Univ. |
| Cao, Yi   | Cranfield Univ. |
| Lao, Liyun  | Cranfield Univ. |

|  |                                 |
|--|---------------------------------|
| 14:50-15:10  | ThB2.5                          |
| <i>A New Discrete Slug-Flow Controller for Production Pipeline Risers</i> , pp. 122-127. |                                 |
| Enricone Stasiak, Marina   | Federal Univ. of Santa Catarina |
| Pagano, Daniel Juan  | Federal Univ. of Santa Catarina |
| Plucenio, Agustinho  | Univ. Federal de Santa Catarina |

|   |     |
|---|-----|
| <b>ThC1</b>   | EL5 |
| <b>Drilling and Oil Field Development (Regular Session)</b> |     |

|  |                                |
|--|--------------------------------|
| 15:30-15:50  | ThC1.1                         |
| <i>Bottomhole Pressure Estimation and L1 Adaptive Control in Managed Pressure Drilling System</i> , pp. 128-133. |                                |
| Li, Zhiyuan  | UIUC                           |
| Hovakimyan, Naira  | UIUC                           |
| Kaasa, Glenn-Ole   | Statoil, Res. Centre Porsgrunn |

|   |        |
|---|--------|
| 15:50-16:10   | ThC1.2 |
| <i>Experimental Control of Annulus Pressure While Drilling Oil Wells</i> , pp. 134-139. |        |
| Vega, Marcia  | UFFRJ  |
| Freitas, Marcela  | UFFRJ  |

|                  |           |
|------------------|-----------|
| Folsta, Mauricio | PETROBRAS |
| Gandelman, Roni  | PETROBRAS |
| Martins, Andre   | PETROBRAS |

|             |        |
|-------------|--------|
| 16:10-16:30 | ThC1.3 |
|-------------|--------|

|  |                                    |
|--|------------------------------------|
| <i>Prospective Approaches to Field Model Adjustment Over Oil Production Process</i> , pp. 140-144. |                                    |
| Grigoriev, Leonid  | Russian State Univ. of Oil and Gas |
| Kazakov, Nikolay   | Russian State Univ. of Oil and Gas |

|             |        |
|-------------|--------|
| 16:30-16:50 | ThC1.4 |
|-------------|--------|

|   |  |
|---|--|
| <i>A Moving Horizon Observer for Estimation of Bottomhole Pressure During Drilling</i> , pp. 145-150. |  |
|---|--|

|                    |  |
|--------------------|--|
| Sui, Dan           | The Norwegian Univ. of Science and Tech. |
| Nybø, Roar         | SINTEF Petroleum Res.                    |
| Hovland, Svein     | Statoil                                  |
| Johansen, Tor Arne | Norwegian Univ. of Science and Tech.     |

|             |        |
|-------------|--------|
| 16:50-17:10 | ThC1.5 |
|-------------|--------|

|  |  |
|--|--|
| <i>Parallel Computing in Optimal Design of Development of Multilayer Oil and Gas Fields</i> , pp. 151-156. |  |
|--|--|

|                     |  |
|---------------------|--|
| Akhmetzyanov, Atlas | Inst. of Control Sciences, Russian Acad. of Sciences   |
| Ermolaev, Alexander | Gubkin Russian State Univ. of Oil and Gas              |
| Grebennik, Oleg     | Inst. of Control Sciences of Russian Acad. of Sciences |

|                                  |     |
|----------------------------------|-----|
| <b>ThC2</b>                      | EL6 |
| <b>Methods (Regular Session)</b> |     |

|             |        |
|-------------|--------|
| 15:30-15:50 | ThC2.1 |
|-------------|--------|

|   |  |
|---|--|
| <i>Designing Large-Scale Balanced-Complexity Models for Online Use</i> , pp. 157-162. |  |
|---|--|

|                      |                |
|----------------------|----------------|
| Elgsæter, Steinar M. | Cybernetica AS |
| Kittilsen, Pål       | Cybernetica AS |
| Hauger, Svein Olav   | Cybernetica AS |

|             |        |
|-------------|--------|
| 15:50-16:10 | ThC2.2 |
|-------------|--------|

|  |  |
|--|--|
| <i>Ensemble Kalman Filter Predictor Bias Correction Method for Non-Gaussian Geological Facies Detection</i> , pp. 163-170. |  |
|--|--|

|                 |   |
|-----------------|---|
| Trivedi, Japan  | Univ. of Alberta, Civil and Environmental Engineering |
| Nejadi, Siavash | Univ. of Alberta, Civil and Environmental Engineering |
| Leung, Juliana  | Univ. of Alberta, Civil and Environmental Engineering |

|             |        |
|-------------|--------|
| 16:10-16:30 | ThC2.3 |
|-------------|--------|

|   |  |
|---|--|
| <i>Discrete Time Variable Structure Control for the Dynamic Positioning of an Offshore Supply Vessel</i> , pp. 171-176. |  |
|---|--|

|                    |                         |
|--------------------|-------------------------|
| Benetazzo, Flavia  | Univ. Pol. delle Marche |
| Ippoliti, Gianluca | Univ. Pol. delle Marche |
| Longhi, Sauro      | Univ. Pol. delle Marche |
| Raspa, Paolo       | Univ. Pol. delle Marche |

|             |        |
|-------------|--------|
| 16:30-16:50 | ThC2.4 |
|-------------|--------|

|  |  |
|--|--|
| <i>Robust Dynamic Positioning of Offshore Vessels Using Mixed-<math>\mu</math> Synthesis, Part I: A Control System Design Methodology</i> , pp. 177-182. |  |
|--|--|

|                     |                                      |
|---------------------|--------------------------------------|
| Hassani, Vahid      | Inst. Superior Tecnico (IST)         |
| Soerensen, Asgeir   | Norwegian Univ. of Science and Tech. |
| Pascoal, Antonio M. | ISR-Inst. Superior Tecnico           |

*Robust Dynamic Positioning of Offshore Vessels Using Mixed- $\mu$  Synthesis Part II: Simulation and Experimental Results*, pp. 183-188.

|                     |   |
|---------------------|---|
| Hassani, Vahid      | Inst. Superior Tecnico (IST)            |
| Soerensen, Asgeir   | Norwegian Univ. of Science and<br>Tech. |
| Pascoal, Antonio M. | ISR-Inst. Superior Tecnico              |

Technical Program for Friday June 1, 2012

|  |                          |
|--|--------------------------|
| <b>FrPIT3</b>  | EL5                      |
| <b>Invited Keynote Presentations</b> (Plenary Session)   |                          |
| 08:30-09:15  | FrPIT3.1                 |
| <i>Recent Developments in Model-Based Optimization and Control of Subsurface Flow in Oil Reservoirs</i> , pp. 189-200. |                          |
| Van den Hof, Paul M.J.   | Eindhoven Univ. of Tech. |
| Jansen, Jan Dirk   | Delft Univ. of Tech.     |
| Heemink, Arnold  | Delft Univ. of Tech.     |

|  |              |
|--|--------------|
| 09:15-10:00  | FrPIT3.2     |
| <i>Challenges of Modeling Drilling Systems for the Purposes of Automation and Control</i> , pp. 201-210. |              |
| Downton, Geoff   | Schlumberger |

|  |                     |
|--|---------------------|
| <b>FrAT1</b>   | EL5                 |
| <b>Drilling Hydraulics</b> (Regular Session)   |                     |
| 10:20-10:40  | FrAT1.1             |
| <i>A Simplified Model for Multi-Fluid Dual Gradient Drilling Operations</i> , pp. 211-216. |                     |
| Stamnes, Øyvind Nistad   | Ocean Riser Systems |
| Mjaavatten, Erlend   | Ocean Riser Systems |
| Falk, Kristin  | Ocean Riser Systems |

|  |                                       |
|--|---------------------------------------|
| 10:40-11:00  | FrAT1.2                               |
| <i>Utilizing Instrumented Stand Pipe for Monitoring Drilling Fluid Dynamics for Improving Automated Drilling Operations</i> , pp. 217-222. |                                       |
| Carlsen, Liv Almås   | IRIS                                  |
| Nygaard, Gerhard   | International Res. Inst. of Stavanger |
| Time, Rune W.  | Univ. of Stavanger                    |

|  |              |
|--|--------------|
| 11:00-11:20  | FrAT1.3      |
| <i>New Choke Controller for Managed Pressure Drilling</i> , pp. 223-230. |              |
| Reitsma, Donald  | Schlumberger |
| Couturier, Yawan   | Schlumberger |

|   |                                       |
|---|---------------------------------------|
| 11:20-11:40   | FrAT1.4                               |
| <i>Safe Mud Pump Management While Conditioning Mud</i> , pp. 231-238. |                                       |
| Cayeux, Eric  | International Res. Inst. of Stavanger |

|   |   |
|---|---|
| 11:40-12:00   | FrAT1.5                                     |
| <i>Suppression of Heave-Induced Pressure Fluctuations in MPD</i> , pp. 239-244. |   |
| Mahdianfar, Hessam  | Norwegian Univ. of Science and Tech. (NTNU) |
| Aamo, Ole Morten  | NTNU  |
| Pavlov, Alexey  | Statoil ASA                                 |

|   |                                 |
|---|---------------------------------|
| <b>FrAT2</b>  | EL6                             |
| <b>Compressor Control</b> (Regular Session)                             |                                 |
| 10:20-10:40   | FrAT2.1                         |
| <i>Hybrid Monitoring of Offshore Compression Systems</i> , pp. 245-250. |                                 |
| Miyoshi, Simone   | Federal Univ. of Rio de Janeiro |
| Zyngier, Danielle   | Federal Univ. of Rio de Janeiro |
| Souza Jr., Maurício   | Federal Univ. of Rio de Janeiro |
| Secchi, Argimiro R.   | PEQ - COPPE/UFRJ                |
| Teixeira, Alex  | Petroleo Brasileiro S.A.        |

|               |  |
|---------------|--|
| Campos, Mário | (Petrobras)<br>Petroleo Brasileiro S.A.<br>(Petrobras) |
| Lima, Enrique | Federal Univ. of Rio de Janeiro                        |
| 10:40-11:00   | FrAT2.2  |

|   |                      |
|---|----------------------|
| <i>Model Predictive Anti-Surge Control of Centrifugal Compressors with Variable-Speed Drives</i> , pp. 251-256. |                      |
| Cortinovia, Andrea  | ABB Switzerland Ltd. |
| Pareschi, Diego   | ABB Italy            |
| Mercangöz, Mehmet   | ABB Switzerland Ltd. |
| Besselmann, Thomas  | ABB Switzerland Ltd. |

|   |                       |
|---|-----------------------|
| 11:00-11:20   | FrAT2.3               |
| <i>Energy Efficient Pump Control for an Offshore Oil Processing System</i> , pp. 257-262. |                       |
| Yang, Zhenyu  | Aalborg Univ.         |
| Soleiman, Kian  | Rambøll Oil & Gas A/S |
| Løhdorf, Bo   | Rambøll Oil & Gas A/S |

|   |   |
|---|---|
| 11:20-11:40   | FrAT2.4                                     |
| <i>Introducing Back-Up to Active Compressor Surge Control System</i> , pp. 263-268. |   |
| Uddin, Nur  | Norwegian Univ. of Science and Tech. (NTNU) |
| Gravdahl, Jan Tommy   | Norwegian Univ. of Science & Tech.          |

|   |                                 |
|---|---------------------------------|
| 11:40-12:00   | FrAT2.5                         |
| <i>On-Line Calibration Monitoring System Based on Data-Driven Model for Oil Well Sensors</i> , pp. 269-274. |                                 |
| Boechat, Andre A.   | Federal Univ. of Santa Catarina |
| Moreno, Ubirajara F.  | Federal Univ. of Santa Catarina |
| Haramura, Decio, Jr.  | Federal Univ. of Santa Catarina |

|   |                               |
|---|-------------------------------|
| <b>FrBT1</b>  | EL5                           |
| <b>Optimization and Control</b> (Regular Session)                                     |                               |
| 13:30-13:50   | FrBT1.1                       |
| <i>Optimization of a Simulated Well Cluster Using Surrogate Models</i> , pp. 275-280. |                               |
| Grimstad, Bjørne  | IO-Center, NTNU and ITK, NTNU |
| Gunnerud, Vidar   | NTNU                          |
| Ljungquist, Dag   | FMC Tech.                     |
| Ausen, Håvard   | NTNU                          |
| Lervik, Victoria  | NTNU                          |

|  |  |
|--|--|
| 13:50-14:10  | FrBT1.2  |
| <i>Problems of Identification of Hydrodynamic Models in Reservoir Engineering</i> , pp. 281-285. |  |
| Akhmetzyanov, Atlas  | Inst. of Control Sciences, Russian Acad. of Sciences |
| Salnikov, Anton  | Inst. of Control Sciences, Russian Acad. of Sciences |

|  |                              |
|--|------------------------------|
| 14:10-14:30  | FrBT1.3                      |
| <i>Oil Reservoir Production Optimization Using Single Shooting and ESDIRK Methods</i> , pp. 286-291. |                              |
| Capolei, Andrea  | Tech. Univ. of Denmark (DTU) |
| Völcker, Carsten   | Tech. Univ. of Denmark       |
| Frydendall, Jan  | Tech. Univ. of Denmark       |
| Jorgensen, John Bagterp  | Tech. Univ. of Denmark       |

|  |         |
|--|---------|
| 14:30-14:50  | FrBT1.4 |
| <i>A Computational Analysis of Convex Combination Models for Multidimensional Piecewise-Linear Approximation in Oil Production Optimization</i> , pp. 292-298. |         |

|                      |                                 |
|----------------------|---------------------------------|
| Silva, Thiago L.     | Federal Univ. of Santa Catarina |
| Codas, Andrés        | UFSC                            |
| Camponogara, Eduardo | Univ. Federal de Santa Catarina |

| FrBT2   | EL6                    |
|---|------------------------|
| <b>Control of Mechanical Systems</b> (Regular Session)  |                        |
| 13:30-13:50   | FrBT2.1                |
| <i>Tool-Point Control for a Redundant Heave Compensated Hydraulic Manipulator</i> , pp. 299-304.                          |                        |
| Kjelland, Magnus Berthelsen   | Univ. of Agder         |
| Tyapin, Ilya  | Univ. of Agder         |
| Hovland, Geir   | Univ. of Agder         |
| Hansen, Michael Rygaard   | Univ. of Agder         |
| 13:50-14:10   | FrBT2.2                |
| <i>Motion Planning and Tracking of Subsea Structures</i> , pp. 305-309.   |                        |
| Fortaleza, Eugenio  | Univ. de Brasilia      |
| 14:10-14:30   | FrBT2.3                |
| <i>Cascade Controller Including Backstepping for Hydraulic-Mechanical Systems</i> , pp. 310-315.                          |                        |
| Choux, Martin   | Univ. of Agder         |
| Hovland, Geir   | Univ. of Agder         |
| Blanke, Mogens  | Tech. Univ. of Denmark |
| 14:30-14:50   | FrBT2.4                |
| <i>The Effect of Friction in Passive and Active Heave Compensation of Crown Block Mounted Compensators</i> , pp. 316-320. |                        |
| Haaø, Jørgen  | Univ. of Agder         |
| Vangen, Steffen   | Univ. of Agder         |
| Tyapin, Ilya  | Univ. of Agder         |
| Choux, Martin   | Univ. of Agder         |
| Hovland, Geir   | Univ. of Agder         |
| Hansen, Michael Rygaard   | Univ. of Agder         |