

**Third Conference of Computational Methods and Ocean Technology  
&  
Second Conference of Oil and Gas Technology in Cold Climate  
(COTech & OGTech 2021)**

*November 25 – 26, 2021, University of Stavanger, Norway and  
Russian State Gubkin University of Oil and Gas, Russia*



**Final Conference Program**

Department of Mechanical and Structural Engineering  
and Materials Science, University of Stavanger





## COTech & OGTech 2021 Conference Program

November 25 – 26, 2021

University of Stavanger, Norway

### Program at glance

| Date                             | Time          | Events  |
|----------------------------------|---------------|---|
| <b>Day 1:</b><br><i>Nov. 25,</i> | 08:00 – 08:30 | Registration  |
|                                  | 08:30 – 09:30 | Conference opening                                    |
|                                  | 09:30 – 10:10 | <b>Keynote 1: Professor Jørgen Amdahl</b>             |
|                                  | 10:10 – 10:50 | <b>Keynote 2: Professor Po Wen Cheng</b>              |
|                                  | 10:50 – 11:20 | Coffee break and group photo program                  |
|                                  | 11:20 – 12:40 | FOUR parallel Sessions (T1-1, T2-1, T2-2, T4-1)       |
|                                  | 12:40 – 13:40 | Lunch break   |
|                                  | 13:40 – 15:00 | FOUR Parallel Sessions (T1-2, T2-3, T3-1, T4-2)       |
|                                  | 15:00 – 15:20 | Coffee break  |
|                                  | 15:20 – 16:00 | <b>Keynote 3 Dr. Sophia Buckingham</b>                |
|                                  | 16:00 – 16:40 | <b>Keynote 4 Professor Gary Wang</b>                  |
|                                  | 16:40 – 17:15 | Transport to Stavanger Oil Museum                     |
|                                  | 17:30 – 19:00 | Visiting Stavanger Oil Museum                         |
|                                  | 19:00 – 21:30 | Conference Dinner                                     |
| <b>Day 2:</b><br><i>Nov. 26</i>  | 08:15 – 08:40 | Registration  |
|                                  | 08:40 – 09:20 | <b>Keynote 5 Bodil Pedersen</b>                       |
|                                  | 09:20 – 10:00 | <b>Keynote 6 Marion Seiersten</b>                     |
|                                  | 10:00 – 10:30 | <b><i>Special event: Book presentation</i></b>        |
|                                  | 10:30 – 10:50 | Coffee break  |
|                                  | 10:50 – 12:20 | FIVE Parallel Sessions (T3-2, T5-1, T6-1, T7-1, T8-1) |
|                                  | 12:20 – 13:20 | Lunch break   |
|                                  | 13:20 – 14:40 | FOUR Parallel Sessions (T2-4, T2-5, T6-2, T7-2)       |
|                                  | 14:40 – 14:55 | Coffee break  |
|                                  | 14:55 – 16:25 | FIVE Parallel Sessions (T2-6, T2-7, T3-3, T3-4, T6-3) |
|                                  | 16:25 – 16:30 | <b>Conference Closing</b>                             |

***Time allocation for presentations:*** Keynote speakers: max. **40 min**;

Each article: **15 min** incl. Q & A (Please limit your presentation to **12 min** and give room for discussions).



## Auditoriums and Zoom links/Access IDs

**Day 1, Thursday, November 25, 2021** (Time given in Oslo time)

| Time          | Auditorium | Session nr. (Track nr.), Zoom link ID and Password  |
|---------------|------------|---|
| 08:30 – 10:50 | KE E-102   | <b>Opening ceremony and Keynote speeches 1 &amp; 2</b><br><a href="https://stavanger.zoom.us/j/63895320427?pwd=NzRlZlZlZW5wUnByN3M0ZVU0WUJldz09;">https://stavanger.zoom.us/j/63895320427?pwd=NzRlZlZlZW5wUnByN3M0ZVU0WUJldz09;</a><br>ID: 38 9532 0427; Password: 391765 |
| 11:20 – 12:40 | KE E-102   | <b>Session 1 (T1-1)</b><br><a href="https://stavanger.zoom.us/j/66161970002?pwd=eDBPUWFndmYwclFZY3YwUVE2V1JmUT09;">https://stavanger.zoom.us/j/66161970002?pwd=eDBPUWFndmYwclFZY3YwUVE2V1JmUT09;</a><br>ID: 661 6197 0002; Password: 645904                               |
|               | KE E-101   | <b>Session 2 (T2-1)</b><br><a href="https://stavanger.zoom.us/j/63547568004?pwd=NytzaVJadEJ2MklHeFhxTEgrK253Zz09">https://stavanger.zoom.us/j/63547568004?pwd=NytzaVJadEJ2MklHeFhxTEgrK253Zz09</a><br>ID: 635 4756 8004; Password: 067827                                 |
|               | KE E-166   | <b>Session 3 (T2-2)</b><br><a href="https://stavanger.zoom.us/j/68473414954?pwd=bExqeFRsK00rVVZoNmxicXNqRUFVQT09;">https://stavanger.zoom.us/j/68473414954?pwd=bExqeFRsK00rVVZoNmxicXNqRUFVQT09;</a><br>ID: 684 7341 4954; Password: 200104                               |
|               | KE E-164   | <b>Session 4 (T4-1)</b><br><a href="https://stavanger.zoom.us/j/66275879691?pwd=NHRhODhER0dKY1IERGY3NXVnNXREQT09">https://stavanger.zoom.us/j/66275879691?pwd=NHRhODhER0dKY1IERGY3NXVnNXREQT09</a><br>; ID: 662 7587 9691; Password: 480771                               |
| 13:40 – 15:00 | KE E-102   | <b>Session 5 (T1-2)</b><br><a href="https://stavanger.zoom.us/j/69333407633?pwd=RUduenBpMldPekdZcG1UOVpLdGlJZz09;">https://stavanger.zoom.us/j/69333407633?pwd=RUduenBpMldPekdZcG1UOVpLdGlJZz09;</a><br>ID: 693 3340 7633; Password: 355746                               |
|               | KE E-101   | <b>Session 6 (T2-3)</b><br><a href="https://stavanger.zoom.us/j/68861237251?pwd=SFm3RnlnRjh3WXIKYnpVRldWYjRldz09;">https://stavanger.zoom.us/j/68861237251?pwd=SFm3RnlnRjh3WXIKYnpVRldWYjRldz09;</a><br>ID: 688 6123 7251; Password: 176054                               |
|               | KE E-164   | <b>Session 7 (T3-1)</b><br><a href="https://stavanger.zoom.us/j/67860681044?pwd=RzlhTHB4azcyMHFOKys5dFBBYVlpUT09;">https://stavanger.zoom.us/j/67860681044?pwd=RzlhTHB4azcyMHFOKys5dFBBYVlpUT09;</a><br>ID: 678 6068 1044; Password: 851497                               |
|               | KE A-204   | <b>Session 8 (T4-2)</b><br><a href="https://stavanger.zoom.us/j/69554201210?pwd=a2JCVUhQUkcyU2dEbk1SNXBXVStrQT09;">https://stavanger.zoom.us/j/69554201210?pwd=a2JCVUhQUkcyU2dEbk1SNXBXVStrQT09;</a><br>ID: 695 5420 1210; Password: 430441                               |
| 15:20 – 16:40 | KE E-102   | <b>Keynote speeches, Keynote 3 and 4</b><br><a href="https://stavanger.zoom.us/j/67668744733?pwd=MFdBRjVMazh2RHVENXpKbnRBcWJzUT09;">https://stavanger.zoom.us/j/67668744733?pwd=MFdBRjVMazh2RHVENXpKbnRBcWJzUT09;</a><br>ID: 676 6874 4733; Password: 712163              |

*Track 1 (T1):* Wind Engineering and Renewable Energy

*Track 2 (T2):* Advanced Computational Methods & Applications in Marine, Subsea and Offshore Technology

*Track 3 (T3):* Computational mechanics, Structural Integrity and Design Optimization

*Track 4 (T4):* Structural Integrity Management and Life Extension of Structures

*Track 5 (T5):* Cold Climate Region Technology

*Track 6 (T6):* Energy Resources Development in the Arctic

*Track 7 (T7):* Technologies in the Upstream Sector in Oil- and Gas Industry with Emphasis on the High North

*Track 8 (T8):* Smart Operations and Maintenance





## Auditoriums and Zoom links/Access IDs

**Day 2, Friday, November 26, 2021** (Time given in Oslo time)

| Time          | Auditorium    | Session nr. (Track nr.), Zoom link ID and Password   |
|---------------|---------------|--|
| 08:40 – 10:30 | KE E-102      | <b>Keynote speeches (Keynote 5 and 6) and special event</b><br><a href="https://stavanger.zoom.us/j/69120282988?pwd=MEdlTDZlTVRoK0N1aFIZUDZ2M0g4Zz09">https://stavanger.zoom.us/j/69120282988?pwd=MEdlTDZlTVRoK0N1aFIZUDZ2M0g4Zz09</a> ;<br>ID: 691 2028 2988; Password: 915676  |
| 10:50 – 12:20 | KE E-101      | <b>Session 9 (T3-2)</b><br><a href="https://stavanger.zoom.us/j/64116692398?pwd=Ukx4MWhPVzdZbWR5UXhvaS90c0kwZz09">https://stavanger.zoom.us/j/64116692398?pwd=Ukx4MWhPVzdZbWR5UXhvaS90c0kwZz09</a><br>Meeting ID: 641 1669 2398; Password: 532995                                |
|               | KE E-102      | <b>Session 10 (T5-1)</b><br><a href="https://stavanger.zoom.us/j/62242144375?pwd=OGFQZlJlTbFNITC9iS0xna08yc1ZYdz09">https://stavanger.zoom.us/j/62242144375?pwd=OGFQZlJlTbFNITC9iS0xna08yc1ZYdz09</a> ;<br>ID: 622 4214 4375; Password: 873313                                   |
|               | KE E-166 /ODC | <b>Session 11 (T6-1)</b><br><a href="https://stavanger.zoom.us/j/68764472146?pwd=UXlmdlJlORCtXaG9hZlN2ZxZTQvZz09">https://stavanger.zoom.us/j/68764472146?pwd=UXlmdlJlORCtXaG9hZlN2ZxZTQvZz09</a><br>Meeting ID: 687 6447 2146; Password: 653344                                 |
|               | KE E-164      | <b>Session 12 (T7-1)</b><br><a href="https://stavanger.zoom.us/j/66525053919?pwd=MWJmQzBEUU5Ra2R0bFdGK25QYm5PQT09">https://stavanger.zoom.us/j/66525053919?pwd=MWJmQzBEUU5Ra2R0bFdGK25QYm5PQT09</a> ;<br>Meeting ID: 665 2505 3919; Password: 947578                             |
|               | KE A-101      | <b>Session 13 (T8-1)</b><br><a href="https://stavanger.zoom.us/j/69299064115?pwd=Ync4SIN1aVczNDVzL2YzMFFVd29KQT09&amp;from=addon">https://stavanger.zoom.us/j/69299064115?pwd=Ync4SIN1aVczNDVzL2YzMFFVd29KQT09&amp;from=addon</a><br>Meeting ID: 692 9906 4115; Password: 526650 |
| 13:20 – 14:40 | KE E-164      | <b>Session 14 (T2-4)</b><br><a href="https://stavanger.zoom.us/j/63978101190?pwd=ZlJlQmhQc0hOUxPMDJoMXlqZHFzQT09">https://stavanger.zoom.us/j/63978101190?pwd=ZlJlQmhQc0hOUxPMDJoMXlqZHFzQT09</a><br>Meeting ID: 639 7810 1190; Password: 446075                                 |
|               | KE E-102      | <b>Session 15 (T2-5)</b><br><a href="https://stavanger.zoom.us/j/69130541206?pwd=bmVLTKZDMjJuZlZlZmZBZlNlZdXhXUT09">https://stavanger.zoom.us/j/69130541206?pwd=bmVLTKZDMjJuZlZlZmZBZlNlZdXhXUT09</a><br>Meeting ID: 691 3054 1206; Password: 940763                             |
|               | KE E-166 /ODC | <b>Session 16 (T6-2)</b><br><a href="https://stavanger.zoom.us/j/64117700616?pwd=R0RCL0YvNEZjZENHMHp0MGUwd1ZqZz09">https://stavanger.zoom.us/j/64117700616?pwd=R0RCL0YvNEZjZENHMHp0MGUwd1ZqZz09</a><br>Meeting ID: 641 1770 0616; Password: 253992                               |
|               | KE E-101      | <b>Session 17 (T7-2)</b><br><a href="https://stavanger.zoom.us/j/68476879440?pwd=WkdlekFHWW54b2tPMkd2VW5GLzFDZz09">https://stavanger.zoom.us/j/68476879440?pwd=WkdlekFHWW54b2tPMkd2VW5GLzFDZz09</a><br>Meeting ID: 684 7687 9440; Passcode: 974816                               |
| 14:55 – 16:25 | KE E-164      | <b>Session 18 (T2-6)</b><br><a href="https://stavanger.zoom.us/j/69702048117?pwd=ZVJlVEJWaldlYzJPSVRzMHBHYmk0UT09">https://stavanger.zoom.us/j/69702048117?pwd=ZVJlVEJWaldlYzJPSVRzMHBHYmk0UT09</a><br>Meeting ID: 697 0204 8117; Password: 449120                               |
|               | KE E-101      | <b>Session 19 (T3-3)</b><br><a href="https://stavanger.zoom.us/j/65746270145?pwd=UFJkQjhPR3hYck5oT2ZtYXRbWXBQZz09">https://stavanger.zoom.us/j/65746270145?pwd=UFJkQjhPR3hYck5oT2ZtYXRbWXBQZz09</a> Meeting ID: 657 4627 0145; Passcode: 241330                                  |
|               | KE E-102      | <b>Session 20 (T3-4)</b><br><a href="https://stavanger.zoom.us/j/65120910612?pwd=MjJzbXlMaEVDZm5MenNPR2lyQ3Zidz09">https://stavanger.zoom.us/j/65120910612?pwd=MjJzbXlMaEVDZm5MenNPR2lyQ3Zidz09</a><br>Meeting ID: 651 2091 0612; Password: 274947                               |
|               | KE A-101      | <b>Session 21 (T2-7)</b><br><a href="https://stavanger.zoom.us/j/64075124420?pwd=QXVHNWtQbDIrQ0I3aWJrdFRad2h4Zz09">https://stavanger.zoom.us/j/64075124420?pwd=QXVHNWtQbDIrQ0I3aWJrdFRad2h4Zz09</a><br>Meeting ID: 640 7512 4420; Password: 235625                               |
|               | KE E-166 /ODC | <b>Session 22 (T6-3)</b><br><a href="https://stavanger.zoom.us/j/67366533564?pwd=V1Fvc3NQeWxRRjVnU2lXYlEwdUFiQT09">https://stavanger.zoom.us/j/67366533564?pwd=V1Fvc3NQeWxRRjVnU2lXYlEwdUFiQT09</a><br>Meeting ID: 673 6653 3564; Password: 569847                               |



## Preface

This conference is organized as a joint event of the COTech (Computational Methods & Ocean Technology) and OGTech (Oil and Gas Technology) conferences. The COTech conference started as part of the research and dissemination activities of the Program Area for research "COTech - Computational methods in Offshore Technology" at Faculty of Science and Technology, University of Stavanger (UiS). This Program Area for Research was founded in 2015 with seven professors, four associate professors, two adjunct professors and five research (PhD) students from the Department of Mechanical and Structural Engineering and Materials Science (IMBM), whose expertise and competence lies primarily within use of computational methods such as finite element methods, boundary and volume element methods, computational fluid dynamics and the like in marine and subsea technology, marine operations, design and analysis of mechanical systems, integrity and reliability of offshore structures and mechanical systems, renewable energy and wind engineering. In the ocean-related engineering area in particular, numerical computation approach is nowadays not only serving as a means to cultivate and realize innovative ideas, but also it is becoming the primary choice to solve complex engineering problems for the harsh and unfriendly environment in the Arctic.

This year's COTech conference is conducted as part of the dissemination activities of the Institute Strategic Program (ISP) entitled "Computational Methods and Ocean Technology" established under the research activities of the Department of Mechanical and Structural Engineering and Materials Science. This three-year program (2021 - 2023) intends to bring researchers of the department under four selected research areas:

1. *Ocean Energy Conversion* - installations & dynamic analysis of offshore wind turbines, structural health monitoring, corrosion assisted fatigue, ocean wave energy.
2. *Aquaculture Technology* - efficient farming techniques, advanced numerical modeling and computation, fluid-structure interaction, design effective maintenance programs for aquaculture.
3. *Marine and Subsea Technology* - sediment erosion (scour), scour prediction CFD models, structural integrity and fatigue life of offshore structures, adaptive control of ROVs in subsea application, predictive maintenance of subsea structures
4. *Innovative Solutions* - 3D printing based innovative solutions, inspection drones, augmented reality for maintenance training, ...

The OGTech conference is organized as part of a collaborative project called UTFORSK between a team of researchers from University of Stavanger and Russian State Gubkin University of Oil and Gas. The overall aim of the project is to make the team stronger and more sustainable. Among others, the project focuses on building a bridge of collaboration in research and education between the two countries, Norway and Russia, that share the Arctic region and to strengthen the research aspects of the Ocean & Offshore Technology field in Arctic environment. By facilitating mobility of researchers and staff in both directions, the project aims to provide a common and successful learning environment for young researchers (Masters and PhDs) to make sure that students have skills and knowledge required in order to face the challenges that the Offshore industry meets in the North - such as environmental aspects and Offshore Technology within subsea/ marine structures in cold climate.

In general, the conference is intended to provide a platform for academics and professionals working within both the Ocean/Offshore and Oil and Gas technologies to come together, present their recent works in the area, exchange ideas, and establish professional networks. It will serve as a forum for multidisciplinary research and bring together Norwegian, Russian and other invited foreign researchers to enable them to exchange their research experience and disseminate their results within the involved fields. The conference is organized under 8 thematic areas, which will also serve as conference tracks.

1. Wind Engineering and Renewable Energy
2. Advanced Computational Methods & Applications in Marine, Subsea and Offshore Technology
3. Computational mechanics, Structural Integrity and Design Optimization
4. Structural Integrity Management and Life Extension of Structures
5. Cold Climate Region Technology
6. Energy Resources Development in the Arctic
7. Technologies in the Upstream Sector in Oil- and Gas Industry with Emphasis on the High North
8. Smart Operations and Maintenance



Among the submitted manuscripts, 92 full papers passed the review process. The review work was conducted according to the review policy of IOP conference series where each paper was reviewed by at least two reviewers involving both national and international reviewers. Seven known experts in the area were invited to present keynote papers from different countries.

The conference committee and editors of this proceeding would like to thank all the reviewers and authors of the papers in this proceeding for their valuable contributions to COTech & OGTech 2021 conference. The financial support from Department of Mechanical and Structural Engineering and Materials Science at University of Stavanger as well as the project funding from HK.dr (The Directorate of Higher Education and Skills) through the UTFORSK project are highly appreciated.

Stavanger, November 24, 2021  
*Hirpa G. Lemu, Prof.*  
Chairman of the Organizing Committee



### Conference Organizing Committee

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Dr. Tiago J. F. Marques Ferradosa  
Assoc. Prof. Yanyan Sha  
Prof. Alexander Ermakov

### Invited Keynote Speakers

**Dr. Sophia Buckingham**, von Karmen Institute (VKI) for Fluid Dynamics, Belgium  
**Prof. Po Wen Cheng**, Stuttgart Wind Energy (SWE), University of Stuttgart, Germany  
**Prof. Gary Wang**, School of Mechanical Systems Engineering, Simon Fraser University, Canada  
**Prof. Jørgen Amdahl**, Norwegian University of Science and Technology (NTNU), Norway  
**Senior Surveyor Bodil Pedersen**, Norwegian Maritime Authority, Norway  
**Prof. Anatoly Zolotukhin**, Gubkin Russian State University (NRU) of Oil and Gas, Russia  
**Chief Scientist Marion Seiersten**, Institute for Energy Technology (IFE), Norway





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| 33. Prof. Koh Chan Ghee               | National University of Singapore (NUS), Singapore     |
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|--|---|
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| 55. Dr. Gro Markset                      | OsloMet, Norway                                       |
| 56. Prof. Tore Markset                   | University of Stavanger, Norway                       |
| 57. Assoc. Prof. Ove Mikkelsen           | University of Stavanger, Norway                       |
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| 59. Assoc. Prof. Pantelis Nikolakopoulos | University of Patras, Greece                          |
| 60. Prof. Håkan Nilsson                  | Chalmers University of Technology, Sweden             |
| 61. Prof. Ove Njå                        | University of Stavanger, Norway                       |
| 62. Dr. Piotr Omenzetter                 | University of Aberdeen, UK                            |
| 63. Prof. Muk Chen Ong                   | University of Stavanger, Norway                       |
| 64. Dr. Theodosios Papathanasiou         | Brunel University, London, UK                         |
| 65. Prof. Dimitrios Pavlou               | University of Stavanger, Norway                       |
| 66. Prof. Demosthenes Polyzos            | University of Patras, Greece                          |
| 67. Dr. Jawad Raza                       | Moreld Apply AS, Norway                               |
| 68. Dr. Zhengru Ren                      | Norwegian Univ. of Sci. and Tech (NTNU), Norway       |
| 69. Prof. Dr. Paulo Rosa-Santos          | Faculty of Engineering, University of Porto, Portugal |
| 70. Assoc. Prof. Amir Safari             | University of South-Eastern Norway                    |
| 71. Prof. Raviliy Safieva                | Russian State Gubkin Univ. of Oil and Gas, Russia     |
| 72. Dr. Mamdouh Salama                   | ConocoPhillips, USA                                   |
| 73. Assoc. Prof. Mustafa S. Abdusselem   | Giresun University, Turkey                            |
| 74. Assoc. Prof. Yanyan Sha              | University of Stavanger, Norway                       |
| 75. Dr. Srinivas Sriramula               | University of Aberdeen, UK                            |
| 76. Ass. Prof. Hodjat Shiri              | Memorial University (MU), Canada                      |
| 77. Prof. Jonas T. Snæbjörnsson          | University of Stavanger, Norway                       |
| 78. Prof. Sudath Siriwardane             | University of Stavanger, Norway                       |
| 79. Prof Magne Sydnes                    | University of Stavanger, Norway                       |
| 80. Prof. Dr. Francisco Taveira-Pinto    | Faculty of Engineering, University of Porto, Portugal |



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| 81. Assoc. Prof. Yiannis Tsompanakis | Technical University of Crete, Greece              |
| 82. Assoc. Prof. Turkeyilmaz         | Nazarbayev University, Kazakhstan                  |
| 83. Ass. Prof. Ling Wan              | University of Newcastle, Singapore                 |
| 84. Prof. Gary Wang                  | Simon Fraser University, Canada                    |
| 85. Dr. Shuaishuai Wang              | Norwegian Univ. of Sci. and Tech (NTNU), Norway    |
| 86. Prof. Kesheng Wang               | Norwegian Univ. of Sci. and Tech (NTNU), Norway    |
| 87. Prof. Anatoly B. Zolotukhin      | Russian State Gubkin Univ. of Oil and Gas, Russia  |
| 88. Dr. Xiaopeng Wu                  | IKM Ocean Design, Norway                           |
| 89. Dr. Guang Yin                    | University of Stavanger, Norway                    |
| 90. Dr. Zhaolong Yu                  | Norwegian Univ. of Sci. and Tech (NTNU), Norway    |
| 91. Prof. Yihan Xing                 | University of Stavanger, Norway                    |
| 92. Prof. Qian Xudong                | National University of Singapore (NUS), Singapore  |
| 93. Prof. Stefanos Zaoutsos          | University of Applied Sciences of Thessaly, Greece |
| 94. Dr. Wuyang Zhang                 | Shanghai Electric, China                           |
| 95. Dr. Xinying Zhu                  | Havfram, Norway                                    |
| 96. Prof. Sigmund Kyrre Ås,          | Norwegian Univ. of Sci. and Tech (NTNU), Norway    |



## Main Conference Program, November 25 and 26, 2021

| DAY 1   |  | Thursday, November 25, 2021                          |
|---|--|--|
| 08:00 -08:30<br><i>Location</i>                   | Registration<br><i>In front of Auditorium E-102</i>  |  |
| 08:30 – 09:30                                     | <b>Opening plenary</b><br>Welcome: Prof. Hirpa G. Lemu, Chairman of Conf. Organizing Committee, UiS<br>Professor Merete Vadla Madland, Vice Rector for Research, University of Stavanger<br>Professor Viktor G. Martynov, Rector of Russian State Gubkin University of Oil and Gas, Russia<br><i>Special event: UiS / Norwegian Offshore Wind Cluster, METcentre</i><br>Professor Tor H. Hemmingen | Auditorium KE E-102<br>( <a href="#">Zoom link</a> ) |
| 09:30 – 10:50<br><i>Chair:</i><br><i>Location</i> | <b>Keynote Speeches I</b><br><b>Professor Tor H. Hemmingsen, University of Stavanger, Norway</b><br>Auditorium KE E-102  | ( <a href="#">Zoom link</a> )                        |
| 09:30 – 10:10                                     | <b>Keynote 1: Assessment of structures subjected to abnormal water slamming events</b><br>Professor Jørgen Amdahl, Norwegian University of Science and Technology, NTNU, Norway  |  |
| 10:10 – 10:50                                     | <b>Keynote 2: How numerical simulations helps the wind turbine growth from 50 kW to 15 MW</b><br>Professor Po Wen Cheng, Stuttgart Wind Energy (SWE) at Institute of Aircraft Design, University of Stuttgart, Germany   |  |
| 10:50 – 11:20                                     | Coffee break and group photo   |  |



## Day 1 Keynote Speeches I 102)

(E-

**Chair: Professor Tor H. Hemmingsen, University of Stavanger**

### Keynote 1

*Assessment of structures subjected to abnormal water slamming events*

**Professor Jørgen Amdahl**, Norwegian University of Science and Technology, NTNU, Norway

**Abstract:** Marine structures are often exposed to the risk of violent water impacts (slamming) where the incident waves are steep and energetic. Examples are bow flare impacts of container vessels, wet deck slamming of high-speed vessels, green water on decks and water impact on deck structures due to sea floor subsidence. A tragic slamming incident occurred on the offshore drilling rig COSL Innovator 2015 which resulted in one fatality.

Traditionally extreme slamming are analyzed and designed for in the ultimate limit state (ULS), where it is assumed that the structure responds primarily in the elastic domain. The coupling between the structural response and the hydrodynamic pressure matters, and hydro-elastic analysis methods for extreme slamming events have been well established. For very rare, viz. abnormal slamming events, the structure may be pushed into the large deflection range causing significant permanent deformations. In these cases, it is necessary to resort to plastic analysis of the structural response in the accidental limit state (ALS), but the interaction with the hydrodynamic pressures should still be maintained.

The presentation outlines the main ideas behind hydro-plastic analysis of stiffened plates subjected to abnormal slamming events. An analytic approach is developed, and the resulting nondimensional relationships may be used to design stiffened plating. The analytic response predictions are compared with results from nonlinear Arbitrary Eulerian\_Lagrangian (ALE) simulations. The starting point is analysis of drop tests of a single stiffener/plate against flat water at small impact angles. This is followed up by a simplified approach to analysis of a breaking wave impact, which also aims to determine the “minimum length” of a breaking wave to produce the permanent deformation. Finally, considerations of the response of complete stiffened panels are presented

### Keynote 2

*How numerical simulations helps the wind turbine growth from 50 kW to 15 MW*

**Professor Po Wen Cheng**, Stuttgart Wind Energy (SWE) at Institute of Aircraft Design, University of Stuttgart, Germany

**Abstract:** In this talk we will travel through the history of numerical simulation and its role in the wind turbine design. Building the largest rotating machine that the humans have ever seen is a daunting task for the engineers. This achievement was only possible with the better understanding of how flexible structures like wind turbines respond to stochastic wind loads. Understanding the stochastic nature of the wind was crucial to simulate the effect of the wind on wind turbines. Simulation techniques were used to study aerodynamic and aeroelastic phenomena that have significant impact on the structural loads. Better understanding of wind turbine response leads to advance control and rotor design that steadily increases the turbine size over the time. We will look into the future challenges on the simulation technology in wind energy. The focus is shifting from components, single wind turbine to wind farms and cluster of wind farms as the complexity of the wind power system increases.





| <b>DAY 1 Thursday, November 25, 2021</b>  |   |
|---|---|
| <b>11:20 – 12:40 Four Parallel Sessions</b>   |   |
| <b>Session 1: Wind Engineering and Renewable Energy (T1-1)</b><br>Session chairs: Assoc. Prof. Knut Erik Giljarhus and<br>Assoc. Prof. Charlotte Obhrai, University of Stavanger, Norway<br>Location: <i>E-102</i> ( <a href="#">Zoom link</a> )  |   |
| 1   | A compensation scheme applied on wind turbine blade pitch control for the reduction of non-torque main shaft loads, <i>R Balakrishna and Y Xing</i>   |
| 2   | Comparison of unidirectional and bidirectional airfoils in a tidal stream turbine, <i>K E Giljarhus, J O Owolabi and O A Frøyenes</i>   |
| 3   | Computational investigation of the aerodynamic performance of reversible airfoils for a bidirectional tidal turbine, <i>K E Giljarhus, G S Shariatpanahi and O A Frøyenes</i>   |
| 4   | Study Review of the Electrical Power Generation - WEC Device System from the Swell (WECFS), <i>Jose V Taboada, V D Casás, X Yu, G M Gemilang and P Sampaio</i>  |
| <u>5</u>  | Submersible power-generating unit as an alternative energy sources, <i>A Kolganov, V Zemlyanovskiy, C Guseinov and N Portnyagin</i>   |
| Underlined presentation numbers are online presentations.   |   |
| <b>Session 2: Advanced Computational Methods &amp; Applications in Marine, Subsea and Offshore Technology (T2-1)</b><br>Session chairs: Professor Zhen Gao, Norwegian University of Science and Technology<br>Professor Yihan Xing, University of Stavanger, Norway<br>Location: <i>E-101</i> ( <a href="#">Zoom link</a> ) |   |
| 1   | Marine operations related to installation of offshore wind turbines and recent research work at NTNU, <i>Zhen Gao, Yuna Zhao, Zhengru Ren, Mengning Wu, Torgeir Moan and Roger Skjetne</i>                                      |
| 2   | Prediction of dynamic mooring responses of a floating wind turbine using an artificial neural network, <i>Fredrik Bjørni, Sverre Lien, Torjus Midtgarden, Geir Kulia, Amrit Verma and Zhiyu Jiang</i>                           |
| 3   | Global analysis of floating offshore wind turbines with shared mooring system, <i>Hammad Munir, Chern Fong Lee and Muk Chen Ong</i>   |
| 4   | Extreme response analysis of a floating vertical axis wind turbine, <i>Chern Fong Lee, Zhengshun Cheng, Muk Chen Ong and Kai Wang</i>   |
| 5   | Digital twin approach of condition-based maintenance for safer offshore production, <i>Yiliu Liu</i>  |
| <b>Session 3: Advanced Computational Methods &amp; Applications in Marine, Subsea and Offshore Technology (T2-2)</b><br>Session chairs: Dr. Guang Yin and Assoc. Professor Yiliu Liu, University of Stavanger, Norway<br>Location: <i>E-166</i> ( <a href="#">Zoom link</a> )   |   |
| 1   | CFD investigation of laminar flow inside elbow pipes, <i>Ridoan Taibi, Guang Yin and Muk Chen Ong</i>   |
| 2   | Numerical investigations of flow around subsea covers at high Reynolds numbers, <i>Guang Yin, Yanni Zhang and Muk Chen Ong</i>  |
| <u>3</u>  | Development of a hydrodynamic model of an oil spill on the Earth's surface and the use of expert technologies in its implementation to assess pollution methods, <i>Marsel Gubaidullin, Aleksey Lokhov and Vladimir Korobov</i> |
| 4   | Scour beneath pipelines due to long-crested and short-crested nonlinear random waves plus current, <i>Dag Myrhaug and Muk Chen Ong</i>  |
| <u>5</u>  | Determining reservoir parameters with nonisothermal real gas flow, <i>Damir Aminev and Marina Kravchenko</i>  |
| Underlined presentation numbers are online presentations.   |   |



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| <b>Session 4: Structural Integrity Management and Life Extension of Structures (T4-1)</b><br>Session chairs: Adj. Prof. Gerhard Ersdal, University of Stavanger, Norway<br>Location: E-164 <a href="#">(Zoom link)</a>   |  |
| 1  | Experimental and numerical evaluation of the axial capacity of cracked tubular members<br><i>S Riise, MR Vågen, MA Atteya and G Ersdal</i>   |
| 2  | Capacity of concrete structures with corroded reinforcement and prestressing tendons<br><i>M Sigvaldsen, G Ersdal, G Markeset, S Samarakoon and M Langeteig</i>                                |
| 3  | A simple machine learning based framework for processing the inline inspection data of subsea pipelines, <i>Z Liu, SS Dahl, ES Larsen and Z Yang</i>   |
| 4  | Fatigue life analysis of wheel-rail contacts at railway turnouts using finite element modelling approach, <i>YD Jelila, HG Lemu, W Pamula and GG Sirata</i>                                    |
| <u>5</u>   | Solutions for monitoring the technical condition of metal structures and pipelines located at an altitude, <i>V Pshenin, A Borisov and S Menshikov</i>   |
| Underlined presentation numbers are online presentations.  |  |
| <b>12:20 – 13:20 Lunch break</b>   |  |
| <b>13:40 – 15:00 Four Parallel Sessions</b>  |  |
| <b>Session 5: Wind Engineering and Renewable Energy (T1-2)</b><br>Session chairs: Assoc. Prof. Charlotte Obhrai and<br>Assoc. Prof. Knut Erik Giljarhus, University of Stavanger, Norway<br>Location: E-102 <a href="#">(Zoom link)</a>  |  |
| 1  | Aerodynamic study of a suspension bridge deck by CFD simulations, wind tunnel tests and full-scale observations, <i>I Kusano, E Cheynet, J Jakobsen and J Snæbjörnsson</i>                     |
| 2  | Dual lidar wind measurements along an upstream horizontal line perpendicular to a suspension bridge, <i>M Nafisifard, J B Jakobsen, E Cheynet, J T Snæbjörnsson, M Sjöholm and T Mikkelsen</i> |
| 3  | Influence of number of simulated wind directions on pedestrian wind comfort maps, <i>T O Hågbo and K E T Giljarhus</i>   |
| 4  | Data-driven prediction of mean wind turbulence from topographic data, <i>B M da Costa, J T Snæbjörnsson, O A Øiseth, J Wang and J B Jakobsen</i>   |
| <b>Session 6: Advanced Computational Methods &amp; Applications in Marine, Subsea and Offshore Technology (T2-3)</b><br>Session chairs: Professor Lars Erik Holmedal, Norwegian University of Science and Technology<br>Dr. Arun Kamath, Norwegian University of Science and Technology<br>Location: E-101 <a href="#">(Zoom link)</a> |  |
| 1  | Vortex dislocations in the Mode A* for flow past a circular cylinder, <i>Cai Tian, Zhaoyu Shi, Fengjian Jiang, Helge Ingolf Andersson, and Lars Erik Holmedal</i>                              |
| 2  | The REEF3D: CFD-based numerical framework for modelling open ocean aquaculture structures, <i>Bihs H, Martin T and Kamath A</i>  |
| 3  | Flow over a dimpled plate, <i>Jianxun Zhu, Lars Erik Holmedal, Cai Tian and Hong Wang</i>  |
| 4  | Coupled hydrodynamic modelling for steep and breaking wave impact on offshore wind turbine substructures, <i>Kamath A, Wang W, Pakozdi C and Bihs H</i>  |
| 5  | Effects of mooring line breakage on dynamic responses of grid moored fish farms, <i>Hui Cheng, Lin Li, Muk Chen Ong, Karl Gunnar Aarsæther and Jaesub Sim</i>                                  |



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| <b>Session 7: Computational Mechanics, Structural Integrity and Design Optimization (T3-1)</b><br>Session chairs: Professor Dimitrios Pavlou, University of Stavanger, Norway<br>Dr Tiago J. F. Marques Ferradosa, University of Porto, Portugal<br>Location: <i>E-164</i> <a href="#">(Zoom link)</a> |   |
| 1  | Mathematical Modelling of Fluid Flow in Electromagnetically Stirred Weld Pool,<br><i>Kjell Enger, Mehdi G. Mousavi and Amir Safari</i>  |
| 2  | Safety related study of Expanding PIN Systems application in Lifting and Drilling Equipment within Construction, Offshore, and Marine sectors, <i>Øyvind Karlsen and Hirpa G Lemu</i> |
| <u>3</u>   | Integrated Computer Digital Decision Application for Offshore Production Automated Management,<br><i>Anastasia Mukhina and Denis Volkov</i>   |
| <u>4</u>   | Code for calculating wave technology of thermal-gas-chemical formation treatment for oil recovery enhancement, <i>Marina Kravchenko, Vladimir Kroshilin and Nina Dieva</i>            |
| <u>5</u>   | Burst strength analysis of composite overwrapped pressure vessel using finite element method,<br><i>Yohannes Regassa, Hirpa G. Lemu and Belete Sirhabizu</i>                          |
| Underlined presentation numbers are online presentations.  |   |
| <b>Session 8: Structural Integrity Management and Life Extension of Structures (T4-2)</b><br>Session chairs: Assoc. Prof. Yanyan Sha, University of Stavanger, Norway<br>Location: <i>A-204</i> <a href="#">(Zoom link)</a>  |   |
| 1  | Local and global assessments of a subsea riser-spool connection under dropped impact loads<br><i>Z Liu, R Igland and S Bruaseth</i>   |
| 2  | Structural Integrity Analysis of Oil-carrying Piperack,<br><i>Ardiansyah Yatim, S Tambunan, M Tambunan, P H Simon, Y Liu</i>  |
| 3  | Glacial ice impact simulation considering hydrodynamic-ice-structure interactions,<br><i>Z Yu and J Amdahl</i>  |
| 4  | Experimental investigation on the mechanical and chemical properties of lightweight aggregate concrete with CO2 curing, <i>Z Wang, S Dehestani, S Kakay and Y Sha</i>                 |
| 5  | Effect of SiO2 and SiO2/TiO2 hybrid nanoparticles on cementitious materials<br><i>J Nori, S Kakay and M Belayneh</i>  |
| <b>15:20 – 16:40</b><br>Chair: Professor Jasna B. Jakobsen, University of Stavanger, Norway<br>Location: <i>Auditorium KE E-102</i> <a href="#">(Zoom link)</a>  |   |
| <b>15:20 – 16:00</b><br><b>Keynote 3: Wind engineering for Belgian offshore wind farms</b><br><i>Dr. Sophia Buckingham, von Karman Institute (VKI) for Fluid Dynamics, Belgium</i>   |   |
| <b>16:00 – 16:40</b><br><b>Keynote 4: AI-driven Design Optimization and Its Applications</b><br><i>Professor Gary Wang, School of Mechatronic Systems Engineering, Simon Fraser University, Canada</i>   |   |
| <b>16:40 – 17:15</b><br>Transport to Stavanger Oil museum  |   |
| <b>17:30 – 19:00</b><br>Visit to Stavanger Oil Museum  |   |
| <b>19:00 – 21:30</b><br>Conference dinner, Bølgen & Moi  |   |



## Day 1 Keynote Speeches II 102)

(E-

**Chair: Professor Jasna B. Jakobsen, University of Stavanger**

### Keynote 3

*Wind engineering for Belgian offshore wind farms*

**Dr. Sophia Buckingham**, von Karman Institute (VKI) for Fluid Dynamics, Belgium

**Abstract:** VKI is involved in research related to the effect of extreme weather events on the operation and maintenance of the existing Belgian offshore wind farms close to Oostende. A long-term measurement campaign aims to correlate weather to wind turbine health monitoring. The talk will reveal the importance of wind-wave misalignment for storm forecasting by WRF, validated by Lidar and Radar measurements and wind tunnel measurements that include a wave basin.

### Keynote 4

*AI-driven Design Optimization and Its Applications*

**Professor Gary Wang**, School of Mechatronic Systems Engineering, Simon Fraser University, Canada

**Abstract:** Optimization as a systematic search methodology has gone through a number of decades of development. Its application in engineering, however, has been limited. This talk will review the development of four generations of optimization technologies from the perspectives of its application in engineering. The focus will be the 4th generation AI-driven optimization strategies. The concept of AI-driven optimization and its various applications in engineering will be introduced. AI-driven optimization methods have overcome shortcomings of traditional optimization approaches and are ready to be widely adopted in engineering practice. They are amenable for simulation-based engineering, easy to use, and powerful in solving both global optimization and multiobjective optimization problems.



| DAY 2         |   | Friday, November 26, 2021 |                             |
|---------------|---|---------------------------|-----------------------------|
| 08:15 – 08:40 | Registration  |                           |                             |
| 08:40 – 10:00 | <b>Keynote Speeches III</b><br><i>Chair:</i> Professor Emeritus Ove T. Gudmestad, University of Stavanger, Norway<br><i>Location:</i> Auditorium KE E-102   |                           | <a href="#">(Zoom link)</a> |
| 08:40 – 09:20 | <b>Keynote 5: The Norwegian Maritime Authority's involvement in development of international Maritime Regulations with emphasis on Polar Regions</b><br><i>Senior Surveyor Bodil Pedersen, Norwegian Marine Authority</i> |                           |                             |
| 09:20 – 10:00 | <b>Keynote 6: Top of line corrosion in gas-condensate pipelines</b><br><i>Marion Seiersten</i>  |                           |                             |
| 10:00 – 10:30 | <b>Special event: Book presentation</b><br><b>Methods for Petroleum Well Optimization: Automation and Data Solutions,</b><br><i>Dr. Rasool Khosravanian and Prof. Bernt Sigve Aadnøy</i>                                  |                           |                             |
| 10:30 – 10:50 | Coffee break  |                           |                             |
| 10:50 – 12:20 | <b>FIVE Parallel Sessions</b>   |                           |                             |
| 12:20 – 13:20 | Lunch break   |                           |                             |





## Day 2 Keynote Speeches III 102)

(E-

**Chair: Professor Emeritus Ove T. Gudmestad, University of Stavanger, Norway**

### Keynote 5

*The Norwegian Maritime Authority's involvement in development of international Maritime Regulations with emphasis on Polar Regions*

**Senior Surveyor Bodil Pedersen**, Department for Cargo Vessels and Mobile Offshore Units, Norwegian Maritime Authority, Norway

**Abstract:** The Norwegian Maritime Authority (NMA) is heavily involved in the development of international maritime regulations in the International Maritime Organization (IMO). The adoption of the mandatory Polar Code by IMO was an important milestone in ensuring safe and sustainable shipping in the Arctic and Antarctic. Norway chaired the work on the development of the Polar Code and the develop of guidance on a methodology for determining limitations for operation in ice in IMO. In addition, Norway together with other member states of the IMO has taken a number of initiatives to help ensure a global and consistent implementation of the Code. The paper will present ongoing activities which at present are prioritized by NMA and give status for the work.

### Keynote 6

*Top of line corrosion in gas-condensate pipelines*

**Chief Scientist Marion Seiersten**, Institute for Energy Technology (IFE), University of Oslo, Norway

**Abstract:** Low alloyed carbon steel is the only viable construction material for long pipelines transporting unprocessed gas-condensate. The aqueous phase that condenses is highly corrosive because it contains dissolved acid gases, i.e., CO<sub>2</sub>, H<sub>2</sub>S and organic acids like acetic and formic acid. The high velocity gas also contains droplets of water and condensate, and these will deposit if they hit the steel surface. Ethylene glycol (MEG) injected to prevent ice and hydrates must be considered when predicting the composition and corrosivity of the aqueous phases in the pipeline.

The liquids gathering at the bottom of the pipe have a higher heat capacity than the gas, and the temperature at the top of the pipe will be slightly lower than at the bottom. As the produced fluids cool during the transport from the hot wells to the process plant, aqueous phase will condense to the cold pipe surface and more to the top than to the bottom. The literature on Top-of-line corrosion (ToLC) has grown steadily since the first reported case in 1960. There are also several prediction models for ToLC.

This review is an overview of the main factors that cause ToLC and how these are modelled. Mass transfer from the aqueous phase at the bottom to the top contribute to the condensation. Despite the low MEG to water ratio in the gas due to the difference in vapour pressure, the fraction of MEG in the condensing water may be considerable. The concentration of MEG in the aqueous phase at the top depends on the mass transfer from bottom. The same is the case for organic acids. Liquid droplets entrained in the gas may deposit top of line and contribute to the chemistry of the aqueous phase. Models for ToLC must thus predict the composition of the condensing phases to be able to estimate the corrosion rate.



## 10:50 – 12:20 FIVE Parallel Sessions

### Session 9: Computational Mechanics, Structural Integrity and Design Optimization (T3-2)

Session chairs: Professor Dimitrios Pavlou, University of Stavanger, Norway  
Assoc. Professor Ove Mikkelsen, University of Stavanger, Norway

Location: E-101

[\(Zoom link\)](#)

|   |  |
|---|--|
| 1 | Numerical Stress Analysis of Tubular Joints, <u>Alejandro Santacruz</u> and Ove Mikkelsen  |
| 2 | Multi-objective optimization and analysis for Laser beam cutting of stainless steel (SS304) using hybrid statistical tools GA-RSM, <u>Amanuel D Tura</u> , Hana B Mamo and Debela G Desisa |
| 3 | Experimental investigation and ANN prediction for part quality improvement of fused deposition modeling parts, <u>Amanuel D Tura</u> , Hana B Mamo, Yohanis D Jelila and Hirpa G Lemu      |
| 4 | Thermal stress analysis of disc brake using analytical and numerical methods, <u>Iyasu T Jiregna</u> and Hirpa G Lemu  |
| 5 | The study of rail-wheel contact problem by analytical and numerical approaches, <u>Gofila Sirata</u> , Hirpa G Lemu, Krzysztof Wacławski and Yohanis Jelila                                |
| 6 | Overview study on challenges of additive manufacturing for a healthcare application, <u>Yosef W Adugna</u> , Adugna D Akessa and Hirpa G Lemu  |

Underlined presentation numbers are online presentations.

### Session 10: Cold Climate Region Technology (T5-1)

Session chairs: Professor Emeritus Ove T. Gudmestad, University of Stavanger, Norway

Location: E-102

[\(Zoom link\)](#)

|   |  |
|---|--|
| 1 | Current methods of subsea production systems survey in the conditions of the Arctic region, <u>Egor Smirnov</u> and Yurii Kharchenko   |
| 2 | A methodology for collecting donning times of thermal protective immersion suits intended to be worn by passengers on vessels operating in cold environments<br><u>Ria Brünig</u> , Edwin R Galea, Bjørn-Morten Batalden and Helle A Oltedal                                       |
| 3 | Study of the metocean conditions of the Russian Arctic Shelf – projects, approaches, results. Review for the period of 2012-2021, <u>Igor Buzin</u> , Y P Gudoshnikov, A V Nesterov, A K Naumov, E A Skutina, K G Smirnov, O M Andreev, R A Vinogradov, S A Novikov and A A Skutin |
| 4 | Identifying challenges facing reliable supply chains and ways to mitigate them for mining in the Baffin Bay region, <u>Jacob Taarup-Esbensen</u> and Ove Tobias Gudmestad  |
| 5 | Use of digital technology to follow the consequences of a warming arctic climate<br><u>Liv Hætta Myrmet</u> and Ove Tobias Gudmestad   |
| 6 | Status and needs for ice tank testing in a changing climate<br><u>Peter Jochmann</u> , Nils Reimer, Quentin Hisette, Daniela Myland and Gesa Ziemer  |

Underlined presentation numbers are online presentations.

### Session 11: Energy Resources Development in the Arctic (T6-1)

Session chairs: Professor Alexander I. Ermakov, Gubkin Russian State University, Russia

Location: Gubkin (ODC Offshore Drilling Center) and E-166

[\(Zoom link\)](#)

|   |  |
|---|--|
| 1 | Problems of development and economic evaluation of production of natural hydrocarbons on the offshore of the Arctic Seas, <u>Juli Bogatkina</u> , <u>Nick Eremin</u> and Olga Sardanashvili  |
| 2 | Research of the possibilities of the existing transport system in Russia for the transportation of goods and methane-hydrogen mixtures for export,<br><u>Elisaveta Safarova</u> , <u>Dina Filippova</u> , Vladimir Stolyarov and Leyla Abukova |
| 3 | Transformation of oil and gas fields based on information technologies,<br><u>Elisaveta Safarova</u> , Vladimir Stolyarov, Anatoliy Dmitrievskiy and Nikolay Eremin  |
| 4 | Transformation of the energy sector in the Arctic in the context of sustainable development of the region, <u>Victoria Fedorova</u> , Ekaterina Kadzhaeva and Kira Vovkodav  |
| 5 | Power supply and control systems for subsea production complexes in Arctic offshore fields,<br><u>Kirill Krotov</u> and Yuri Kharchenko  |



**Session 12: Technologies in the Upstream Sector in Oil- and Gas Industry with Emphasis on the High North (T7-1)**

Session chairs:

Professor Tor H. Hemmingsen, University of Stavanger  
Professor Malcolm Kelland, University of Stavanger, Norway

*Location:* E-164

*(Zoom link)*

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|---|--|
| 1 | Development of the digital oil and gas complex in Arctic areas of Russia,<br><i>Anatoly Dmitrievsky, Nikolai Eremin, Irina Basnieva and Aleksey Kondratyuk</i>                               |
| 2 | The oil and gas potential of the north of the Siberian platform and adjacent shelf,<br><i>Anatoly Dmitrievsky, Nikolai Eremin, Nikolai Shabalin, Irina Basnieva and Alexey T. Kondratyuk</i> |
| 3 | Performance of sodium lignosulfonate as thickening additive in compositions for matrix acidizing of bottom hole zone, <i>Andrey Alekseevich Sentemov</i>                                     |
| 4 | An evaluation of key challenges of CO <sub>2</sub> transportation with a novel Subsea Shuttle Tanker,<br><i>Yucong Ma, Yihan Xing and Tor Hemmingsen</i>                                     |

Underlined presentation numbers are online presentations.

**Session 13: Smart Operations and Maintenance (T8-1)**

Session chairs:

Dr. Jawad Raza, Moreld Apply AS, Norway  
Dr. Alireza Gelyani, Aker Solutions AS, Norway

*Location:* A-101

(Zoom link)

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|---|--|
| 1 | Implementing the autonomous adaptive algorithm to manage ESP operation in harsh reservoir conditions, <i>M Antonic, M Solesa, G Thonhauser, A Zolotukhin and M Aleksic</i> |
| 2 | Failure prediction of reservoir pressure maintenance system at the Prirazlomnoye Arctic Offshore field, <i>I Kurchatov</i>   |
| 3 | Maintenance philosophy for an unmanned platform: A case study for an Offshore wind substation, <i>K Tolstow, A Beiky and I El-Thalji</i>                                   |
| 4 | Azure machine learning studio and SCADA data for failure detection and prediction purposes: A case of wind turbine generator, <i>A Elmenshawy, Z Gul and I El-Thalji</i>   |
| 5 | Workflow and concept study to design mixed reality assisted safety training in the wind energy sector, <i>S C Joghee and I El-Thalji</i>                                   |
| 6 | Combined principal component analysis and proportional hazard model for optimizing condition-based maintenance, <i>T Bankole-Oye and I El-Thalji</i>                       |

Underlined presentation numbers are online presentations.

12:20 – 13:20

**Lunch break**



### 13:20 – 14:40 FOUR Parallel Sessions

#### Session 14: Advanced Computational Methods & Applications in Marine, Subsea and Offshore Technology (T2-4)

Session chairs: Assoc. Professor Lin Li, University of Stavanger, Norway  
 Assoc. Professor Zhenhui Liu, Western Norway University of Applied Sciences  
 Location: E-164 [\(Zoom link\)](#)

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|---|--|
| 1 | Case study on advanced 3D finite element limit analysis of counter-acts installed at Ormen Lange, <u>Christian Olsen and Kristian Krabbenhoft</u>                |
| 2 | Simulation of peak tension loads in subsea power cables during installation, <u>Lene Okkerstrøm, Ove Tobias Gudmestad and Egil Pedersen</u>                      |
| 3 | Numerical study on deployment of subsea template using coupled and uncoupled model, <u>Nils Olav Hauge and Lin Li</u>  |
| 4 | A practical design procedure for initial sizing of heaving point absorber wave energy converters, <u>Mehdi Behboodi Jouybari and Yihan Xing</u>                  |
| 5 | Numerical simulation of the sliding impact between ice floe and a ship hull structure in ABAQUS, <u>Jianan Zhang, Zhenhui Liu, Muk Chen Ong and Wenyong Tang</u> |

Underlined presentation numbers are online presentations.

#### Session 15: Advanced Computational Methods & Applications in Marine, Subsea and Offshore Technology (T2-5)

Session chairs: Professor Hans Bihs, Norwegian University of Science and Technology  
 Dr. Jianxun Zhu, Norwegian University of Science and Technology  
 Location: E-102 [\(Zoom link\)](#)

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| 1 | Large-scale wave modelling for the Norwegian coastal and offshore industries, <u>Wang W, Kamath A, Pakozdi C and Bihs H</u>  |
| 2 | Oscillatory flow over a plate with one dimple, <u>Hong Wang, Lars Erik Holmedal, Jianxun Zhu and Cai Tian</u>  |
| 3 | Validation of the direct forcing immersed boundary method of REEF3D for floating objects, <u>Soydan A, Kamath A, Martin T and Bihs H</u>   |
| 4 | Large Eddy Scale simulations of an open channel flow with surface waves using an ALE formulation, <u>Xinru Wang, Lars Erik Holmedal, Torbjørn Utnes, Hong Wang, Jianxun Zhu, Dag Myrhaug</u> |
| 5 | Modal analysis of wake behind stationary and vibrating cylinders, <u>Marek Jan Janocha, Guang Yin and Muk Chen Ong</u>   |

#### Session 16: Energy Resources Development in the Arctic (T6-2)

Session chairs: Professor Alexander I. Ermakov, Gubkin Russian State University, Russia  
 Location: Gubkin (ODC) and E-166 [\(Zoom link\)](#)

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| <u>1</u> | Digital core modeling technology for determining the reservoir-capacitive properties of terrigenous reservoirs, <u>Marsel Gubaidullin and Ivan Belozarov</u> |
| <u>2</u> | Generative adversarial networks for modeling reservoirs with permeability anisotropy, <u>Ramil Guliev</u>  |
| 3        | Decarbonized LNG: Creating a path to sustainable Arctic development, <u>Victoria Fedorova and A. Mitryaykina</u>   |
| <u>4</u> | Computer technologies to determine offshore facilities suitable for the climatic conditions, <u>I. Shatrovsky and Anatoly Zolotukhin</u>                     |
| <u>5</u> | Deep learning based restoration of lost sections in Micro-CT core plugs, <u>Sergey Arsenyev-Obraztsov and Grigorii Plusch</u>                                |

Underlined presentation numbers are online presentations.





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| <b>Session 17:</b> Technologies in the Upstream Sector in Oil- and Gas Industry with Emphasis on the<br>Session chairs: High North (T7-2)<br>Professor Tor H. Hemmingsen, University of Stavanger, Norway<br>Adj. Professor Torfinn Havn, University of Stavanger, Norway<br>Location: E-101 <a href="#">(Zoom link)</a> |   |
| 1  | The effect of volatile organic acids and CO <sub>2</sub> on the corrosion rate of carbon steel from a Top-of-Line-Corrosion (TLC) perspective, <i>Sondre Borg Gjertsen, Attila Palencsar, Marion Elisabeth Seiersten and Tor Henning Hemmingsen</i>                           |
| <u>2</u>   | Complex geodynamic indicators for forecasting hydrocarbon deposits in the Arctic zone, <i>Vladimir Minaev, Rodion Stepanov and Aleksandr Faddeev</i>  |
| 3  | Multi-functional oilfield production chemicals: maleic-based polymers for gas hydrate and corrosion inhibition, <i>Malcolm Kelland, Janronel Pomicpic, Radhakanta Ghosh, Camilla Undheim, Tor H Hemmingsen, Qian Zhang, Mikhail Varfolomeev, R Pavelyev and S Vinogradova</i> |
| 4  | Anti-icing and hydrophobic properties of polymer coatings dedicated for outdoor applications in challenging environments, <i>Rafal Kozera, Bartłomiej Przybyszewski; Bogna Sztorch; Robert E. Przekop; Katarzyna Zolynska, Anna Boczkowska</i>                                |
| Underlined presentation numbers are online presentations.  |   |
| <b>14:40 – 14:55</b> Coffee break  |   |
| <b>14:55 – 16:25 FIVE Parallel Sessions</b>  |   |
| <b>Session 18: Advanced Computational Methods &amp; Applications in Marine, Subsea and Offshore Technology (T2-6)</b><br>Session chairs: Assoc. Professor Zhiyu Jiang, University of Adger, Norway<br>Geir Kulia, Signal Analysis Lab, Norway<br>Location: E-164 <a href="#">(Zoom link)</a>                             |   |
| 1  | Offshore Wind to oil and gas: Legal aspects, <i>Ignacio Herrera Anchustegui</i>   |
| 2  | Burst pressure design of the cargo tank used in a novel large subsea freight-glider, <i>Yihan Xing</i>  |
| <u>3</u>   | Duplex steel welding in arctic conditions – Correlation of welding parameters in relation to HISC, <i>Ziemowit Czarnacki and Yihan Xing</i>   |
| 4  | A 2D model for the study of equilibrium glide paths of UiS Subsea Freight-Glider, <i>Usman Nawaz Ahmad and Yihan Xing</i>   |
| 5  | Applied data science: Condition monitoring of rotating machinery, <i>Geir Kulia</i>   |
| Underlined presentation numbers are online presentations.  |   |
| <b>Session 19: Computational Mechanics, Structural Integrity and Design Optimization (T3-3)</b><br>Session chairs: Dr. Tiago J. F. Marques Ferradosa, University of Porto, Portugal<br>Assoc. Pro. Nirosha Adasooriya University of Stavanger, Norway<br>Location: E-101 <a href="#">(Zoom link)</a>                     |   |
| 1  | Bending-induced local buckling during offshore installation of multi-layered FRP pipelines, <i>Dimitrios Pavlou and Nirosha Adasooriya</i>  |
| 2  | Recent work and prospective analysis on offshore structures and marine energy harvesting at the Faculty of Engineering of the University of Porto, <i>Francisco Taveira Pinto, Paulo Rosa-Santos and Tiago Fazeres Ferradosa</i>  |
| 3  | FRP pipeline performance in tensional and torsional S-lay installation loads, <i>Dimitrios Pavlou</i>   |
| 4  | Environment-assisted fatigue of steel bridges: A conceptual framework for life assessment, <i>Julie Stave Sandviknes, Nirosha Adasooriya, Dimitrios Pavlou and Tor Hemmingsen</i>   |
| 5  | Mechanical response and strength characteristics of aluminum honeycomb sandwich panels for infrastructure engineering, <i>Stefanos Zaoutos</i>  |
| 6  | Approach for monitoring of the structural integrity of the wind turbine components, <i>Krzysztof Dragan, Michał Dziendzikowski, Rafał Kozera, Anna Boczkowska</i>   |





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| <b>Session 20: Computational Mechanics, Structural Integrity and Design Optimization (T3-4)</b><br>Session chairs: Professor Sudath C. Siriwardane, University of Stavanger, Norway<br>Professor Stefanos Zaoutsos, University of Thessaly, Hellas<br>Location: <i>E-102</i> <a href="#">(Zoom link)</a> |   |
| 1  | Review on fatigue life assessment methods for welded joints in orthotropic steel decks of long-span bridges, <u>Bruno Villoria</u> , <u>Sudath C. Siriwardane</u> and <u>Hirpa G Lemu</u>   |
| 2  | Tension testing of additively manufactured specimens of 17-4 PH processed by Bound Metal Deposition (BMD), <u>Fredrik Bjørheim</u> and <u>Isabel M. La Torraca Lopez</u>  |
| 3  | Lateral torsional buckling capacity of corroded steel beams: A parametric study, <u>Greta Kullashi</u> , <u>Sudath C. Siriwardane</u> and <u>Mostafa Ahmed Attaya</u>   |
| 4  | Bending capacity of multilayered FRP pipelines during offshore installation, <u>Dimitrios Pavlou</u>  |
| 5  | Subsea FRP pipeline performance in external pressure: Failure and external pressure-induced buckling, <u>Dimitrios Pavlou</u>   |
| 6  | Characterization of acoustic emission signals under 3-point bending test, <u>Bao Gia Ngoc Nguyen</u> , <u>Hirpa G Lemu</u> , <u>Ole Gabrielsen</u> and <u>Idriss El-Thalji</u>  |
| <b>Session 21: Advanced Computational Methods &amp; Applications in Marine, Subsea and Offshore Technology (T2-7)</b><br>Session chairs: Professor Yihan Xing and Dr. Guang Yin, University of Stavanger, Norway<br>Location: <i>A-101</i> <a href="#">(Zoom link)</a>                                   |   |
| 1  | Validation and assessment of different RANS turbulence models for simulating turbulent flow through an orifice plate, <u>Agata P Jurga</u> , <u>M J Janocha</u> , <u>G Yin</u> , <u>Knut Erik Giljarhus</u> and <u>Muk Chen Ong</u>   |
| 2  | Suspended inter-array power cable configurations between two spar floating offshore wind turbines, <u>Anja Schnepf</u> , <u>Carlos Lopez-Pavon</u> , <u>Muk Chen Ong</u> , <u>Guang Yin</u> and <u>Øyvind Johnsen</u>   |
| 3  | Computational fluid dynamics simulation of buoyant mixing of miscible fluids in a tilted tube, <u>Maryam Ghorbani</u> , <u>Knut Erik Teigen Giljarhus</u> , <u>Hans Joakim Skadsem</u> and <u>Rune Wiggo</u>  |
| 4  | Tuning for robust and optimal dynamic positioning control in BlueROV2, <u>Xu Yang</u> and <u>Yihan Xing</u>   |
| 5  | Technical and feasibility study of subsea shuttle tanker, <u>Tan A Dwi Santoso</u> , <u>Yucong Ma</u> and <u>Y Xing</u>   |
| Underlined presentation numbers are online presentations.  |   |
| <b>Session 22: Energy Resources Development in the Arctic (T6-3)</b><br>Session chairs: Professor Alexander I. Ermakov, Gubkin Russian State University, Russia<br>Location: <i>Gubkin (ODC) and E-166</i> <a href="#">(Zoom link)</a>   |   |
| 1  | Performance of Waterborne Polyurethane based on N-tert-butyldiethanolamine in Corrosion Inhibition, <u>Yulia Zaripova</u> , <u>Mikhail Varfolomeev</u> , <u>Roman Pavelyev</u> , <u>Abdolreza Farhadian</u> , <u>Vladimir Yarkovoi</u> , <u>Svetlana Vinogradova</u> and <u>Iskander Vakhitov</u> |
| 2  | Analysis of a new underwater LNG storage tank, <u>Vadim Zemlyanovskiy</u> , <u>Chingiz Guseynov</u> and <u>Alexander Kolganov</u>   |
| 3  | Optimization approach for Arctic field development design using subsea production systems, <u>Iuliia Beskizhko</u>  |
| 4  | Complex-shielded hydrocarbon fields of the lower Permian deposits on the eastern part of the Russian platform, <u>Anastasia Drabkina</u> and <u>Vladimir Utoplennikov</u>   |
| 5  | Requirements for radar navigation aids for operational safety of autonomous navigation for of facilities of the Arctic oil and gas complex, <u>Nikolay Golov</u> , <u>Alexander Ermakov</u> , <u>Sergey Presnyakov</u> and <u>Vadim Usachev</u>   |
| Underlined presentation numbers are online presentations.  |   |
| <b>16:25 – 16:30 Conference Closing</b>  |   |



## Conference Organizer

### **Department of Mechanical and Structural Engineering and Materials Science**



Bachelor studies within

- Mechanical Engineering
- Structural Engineering

MSc studies within

- Engineering Structures and Materials
- Industrial Asset Management
- Marine- and Offshore Technology

PhD-studies within

- Offshore Technology

