

www.isopec.org; www.isopec2012.org

June 17–22, Rhodes (Rodos), Greece

The Twenty-second (2012) International
**Offshore and Polar
Engineering Conference**

In addition ISOPE specialty symposia:

- 1st Tsunami & Safety
- 1st Asset Integrity
- 3rd Arctic Science & Technology
- 2nd Arctic Materials
- 3rd Renewable Energy & Environment
- 4th Sloshing Dynamics & Design
- 4th Frontier & Clean Energy Tech
- 10th High-Performance Materials
- 5th Strain-Based Design

ISOPE-2012

Rodos Palace Hotel, Rhodes, Greece, June 17–22

Technical Program

Refereed papers from **52** countries in **150** technical general
Plenary and keynote presentations
General Information, Reservations, Publications and Program
Updates on www.isopec.org www.isopec2012.org
Forms for Advance Registration and Venue Hotel:
Inside this program and on www.isopec.org www.isopec2012.org

Organized by:

Technical Program Committee, ISOPE

Sponsored by:

International Society of Offshore and Polar Engineers (ISOPE)
with cooperating organizations (listed inside)



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ISOPE Awards, Scholarship, and Student Forum:
Presentation at Banquet



Conference Opening Session



Annual Conference Banquet

More photos on www.isopec.org and www.isopec2012.org
ISOPE-2011 Maui

21st Annual International Ocean and Polar Engineering
Conference, Maui, June 19-24, 2011

Welcome to ISOPE-2012 Conference

We greatly appreciate the excellent responses with **1250+** abstracts and help we have received from colleagues around the world in the successful organization of the 22nd International Offshore and Polar Engineering Conference (ISOPE-2012), Rhodes, Greece, June 17–22, 2012. The Conference features **150** sessions of *peer-reviewed* papers and **8** keynote presentations from more than **52 countries**, including the ISOPE specialty symposia as a part of the ISOPE-2012 Conference.

The conference program is issued in 2 versions: Printed and internet (www.isopec.org and www.isopec2012.org). To meet the page limit, only the first author data are listed in the printed version, and the internet version lists all authors.

The purposes of the ISOPE conference are to:

- * Promote technological progress and activities, international technological transfer and cooperation, and opportunities for engineers to maintain and improve technical competence; and
- * Provide a timely international forum for technical activities, cooperation, opportunity and fellowship among researchers and engineers by developing focused session topics with high quality papers (in both originality and significance) accepted through rigorous review, establishing high international standards for publication and worldwide distribution and promoting interdisciplinary interaction between academia and industry.

The International Society of Offshore and Polar Engineers (ISOPE) has already held **49 successful international meetings** with peer-reviewed papers:

- 1st (1990) European Offshore Mechanics Symposium (**EUROMS-90**) Trondheim; **EUROMS-99** Moscow;
- 1st (1990) Pacific/Asia Offshore Mechanics Symposium (**PACOMS-90**) Seoul; **PACOMS-94** Beijing; 1996 Pusan, 2002 Daejeon, 2004 Vladivostok, 2006 Dalian, 2008 Bangkok, 2010 Busan
- Annual **ISOPE** conferences, starting in Edinburgh, 1991 were held in San Francisco, Singapore, Osaka, The Hague, Los Angeles, Honolulu, Montréal, Brest, Seattle, Stavanger, Kitakyushu, Honolulu, Toulon, Seoul, San Francisco, Lisbon, Vancouver, Osaka, Beijing and Maui. Since 1992, the annual ISOPE conference program has been the world's largest of its kind with peer-reviewed papers;
- 1st (1995) ISOPE Ocean Mining Symposium (**OMS-95**), Tsukuba, 1995, Seoul, Goa, Szczecin, Tsukuba, Changsha, Lisbon; Chennai
- 1st (1996) International Deep-Ocean Technology (**IDOT-96**) Symposium and Workshop, 1996 Los Angeles; 2001 Stavanger and 2009 Beijing;
- ISOPE **HPM** Symposium: Honolulu 2003, Toulon 2004, Seoul 2005, San Francisco 2006, Lisbon 2007, Vancouver 2008; Osaka 2009 and Beijing 2010 ;
- ISOPE Series of specialty symposia : **ANGT**: Seoul 2005-; **Strain-Based Design SBD**: Lisbon 2007-; **Nanotechnology NANOS**: Lisbon 2007 Frontier Energy; **Sloshing Dynamics, Sloshing-2009-**, **Renewable Energy/Environment, REES-2010**; Arctic Science & Tech, **Arctic-2010-**; **Arctic Materials-2011-**; **Asset Integrity-2012-**

On behalf of the Technical Program Committee, it is our pleasure to welcome participants from all over the world to the ISOPE-2012 Conference in Rhodes, Greece.

Jin S Chung, USA	Demos Angelides Greece	Ronald H Knapp USA
Xizhao Jiang China	Shigeru Naito Japan	Michael Isaacson Canada

Co-chairmen of the ISOPE-2012 Conference

SUNDAY JUNE 17

09:00 ISOPE Board of Directors Meeting Executive D
10:30 ISOPE-2010 Executive Committee Meeting Executive D
EUROMS and PACOMS Executive Committees
15:00-18:00
CONFERENCE REGISTRATION Lobby
17:00-18:00
WELCOME RECEPTION Outdoor Pool Garden
Tour Information Visit tour desk in ISOPE registration area:
www.isopec.org
Spouse Program Join Tour program: see www.isopec.org

MONDAY June 18

On-Site Registration starts at 07:30 Lobby
07:30 Session Chair/Co-chair Briefing Lobby

08:30 Conference Opening Jupiter
08:30
1. OCEAN AND ENERGY INDUSTRY REVIEW—2011 Jupiter

10:30
2. LNG SLOSHING I: GTT Progress Room 1
3. VORTEX-INDUCED VIBRATIONS I Room 2
4. RENEWABLE ENERGY I: Wind 1: Foundations 1 Room 3
5. TSUNAMI I: 2011 Tohoku Tsunami 1 Room 4
6. ASSET INTEGRITY I Room 5
7. ENVIRONMENT I: Oil Spill and Emission Room 6
8. SBD I: Materials Room 7
9. FRONTIER ENERGY I: Clean Energy Room 8
10. RISK & RELIABILITY I Room 9
11. UNDERSEA I: Operation and Communication 1 Room 10

14:00
12. LNG SLOSHING II: Physics & Coupling Room 1
13. VORTEX-INDUCED VIBRATIONS II Room 2
14. RENEWABLE ENERGY II: Wind 2: Foundations 2 Room 3
15. TSUNAMI II: 2011 Tohoku Tsunami 2 Room 4
16. ASSET INTEGRITY II Room 5
17. ENVIRONMENT II: Physical & Chemical Processes Room 6
18. SBD II: Numerical Modeling Room 7
19. FRONTIER ENERGY II: Clean Coal Room 8
20. RISK & RELIABILITY II Room 9
21. UNDERSEA II: Operation and Communication 2 Room 10

16:20
22. LNG SLOSHING III: LNG Tank Design 1 Room 1
23. HYDRODYNAMICS I: MetOcean 1 Room 2
24. RENEWABLE ENERGY III: Wind 3: Substructures Room 3
25. TSUNAMI III: Generation & Warning 1 Room 4
26. ASSET INTEGRITY III Room 5
27. ENVIRONMENT III: Water & Sediment Qualities Room 6
28. SBD III: Strain Capacity Characterization Room 7
29. FRONTIER ENERGY III: Hydrate Fundamental Room 8
30. RISK & FATIGUE Room 9
31. UNDERSEA III: Vehicle and Control 1 Room 10

18:30 Find from the bulletin board
ISOPE Technical Committee Meetings

Tuesday June 19

07:30 Session Chair/Co-chair Briefing	Lobby
08:00	
32. LNG SLOSHING IV: LNG Tank Design 2	Room 1
33. HYDRODYNAMICS II: MetOcean 2	Room 2
34. RENEWABLE ENERGY IV: Wind 4: Dynamics 1	Room 3
35. TSUNAMI IV: Generation & Warning 2	Room 4
36. ASSET INTEGRITY IV	Room 5
37. COASTAL I:Waves & Modeling 1	Room 6
38. SBD IV: Fracture Mechanics	Room 7
39. FRONTIER ENERGY IV: Hydrate Development	Room 8
40. OFFSHORE MECHANICS I: Floating Dynamics 1	Room 9
41. UNDERSEA IV: Vehicle and Control 2	Room 10
10:30	
42. LNG SLOSHING V: Sloshing Tests	Room 1
43. HYDRODYNAMICS III: MetOcean 3	Room 2
44. RENEWABLE ENERGY V: Wind 5: Floating 1	Room 3
45. TSUNAMI V: Generation & Warning 3	Room 4
46. ADVANCED SHIP TECH I: Ultimate Strength	Room 5
47. COASTAL II: Waves & Modeling 2	Room 6
48. SUBSEA, PIPELINES, RISERS I: NORD Stream	Room 7
49. FRONTIER ENERGY V: Hydrate Modeling	Room 8
50. OFFSHORE MECHANICS II: Floating Dynamics 2	Room 9
51. ARCTIC MATERIALS I	Room 10
13:00	
Chung Award Lecture	Room 2
14:00	
52. LNG SLOSHING VI: CFD	Room 1
53. HYDRODYNAMICS IV: Freak and Long Waves	Room 2
54. RENEWABLE ENERGY VI: Wind 6: Floating 2	Room 3
55. TSUNAMI VI: Propagation & Flooding	Room 4
56. ADVANCED SHIP TECH II: At-Sea Explosions	Room 5
57. COASTAL III: Waves & Modeling 3	Room 6
58. SUBSEA, PIPELINES, RISERS II: New Concept Develop.	Room 7
59. GEOTECH I: Suction Piles	Room 8
60. OFFSHORE MECHANICS III: Systems I	Room 9
61. ARCTIC MATERIALS II	Room 10
16:20	
62. LNG SLOSHING VII: Structural Responses	Room 1
63. HYDRODYNAMICS V: Wave Loading	Room 2
64. RENEWABLE ENERGY VII: Wind 7: Analysis Tools	Room 3
65. TSUNAMI VII: Structure & Sediment 1	Room 4
66. HPM I: Adv Materials & Structures 1	Room 5
67. COASTAL IV: Breakwaters & Waves 1	Room 6
68. SUBSEA, PIPELINES, RISERS III: Panel	Room 7
69. GEOTECH II: Offshore Foundations	Room 8
70. OFFSHORE MECHANICS IV: Systems II	Room 9
71. ARCTIC I: Navigation in Pack Ice	Room 10
15:30 Awards Committee Meeting	Executive D
16:30 Board of Editors Meeting	Executive D
18:00 Student Forum (advance reservation to isope-2@isope-org)	

WEDNESDAY JUNE 20

07:30	Session Chair/Co-chair Briefing	Lobby
08:00		
72.	RENEWABLE ENERGY XVI: Wave 4	Room 1
73.	HYDRODYNAMICS VI: Floating-Body Dynamics 1	Room 2
74.	RENEWABLE ENERGY VIII: Wind 8: Concepts	Room 3
75.	TSUNAMI VIII: Structure & Sediment 2	Room 4
76.	HPM II: Adv Materials & Structures 2	Room 5
77.	COASTAL V: Breakwaters & Waves 2	Room 6
78.	SUBSEA, PIPELINES, RISERS IV: Improved Perform.	Room 7
79.	GEOTECH III: Soil Improvement	Room 8
80.	FRONTIER ENERGY VI: Ocean Mining 1: Minerals	Room 9
81.	ARCTIC II: Ice Mechanics	Room 10
10:30		
82.	RENEWABLE ENERGY XVII: Wave 5	Room 1
83.	HYDRODYNAMICS VII: Floating-Body Dynamics 2	Room 2
84.	RENEWABLE ENERGY IX: Wind 9: Codes & Design	Room 3
85.	TSUNAMI IX: Risk Assessment 1	Room 4
86.	HPM III: Composites	Room 5
87.	COASTAL VI: Breakwaters & Waves 3	Room 6
88.	SUBSEA, PIPELINES, RISERS V: Component Develop	Room 7
89.	GEOTECH IV: Cyclic Loading	Room 8
90.	FRONTIER ENERGY VII: Ocean Mining 2: Systems	Room 9
91.	ARCTIC III: Coastal Arctic Properties	Room 10
12:00	ISOPE Board of Directors Meeting	Executive D
13:15	Plenary Presentation: Pipeline	Room 1
14:00		
92.	RENEWABLE ENERGY XVIII: Wave 6: Resources	Room 1
93.	HYDRODYNAMICS VIII: Floating-Body Dynamics 3	Room 2
94.	RENEWABLE ENERGY X: Wind 10: Resources	Room 3
95.	TSUNAMI X: Risk Assessment 2	Room 4
96.	HPM IV: Fatigue & Fracture 1	Room 5
97.	COASTAL VII: Wave-Structure Interaction	Room 6
98.	SUBSEA, PIPELINES, RISERS VI: Fatigue Assessment	Room 7
99.	GEOTECH V: Slope Stability	Room 8
100.	OFFSHORE MECHANICS V: Deepwater Installation	Room 9
101.	ARCTIC IV: Ice Environment & Forecasting	Room 10
16:20		
102.	RENEWABLE ENERGY XIX: Tidal & Current 1	Room 1
103.	HYDRODYNAMICS XIII: DP & Control	Room 2
104.	RENEWABLE ENERGY XI: Wind 11: Power 4	Room 3
105.	ADVANCED SHIP TECH III: Collision & Vibration	Room 4
106.	HPM V: Fatigue & Fracture 2	Room 5
107.	COASTAL VIII: Estuary Hydraulics	Room 6
108.	SUBSEA, PIPELINES, RISERS VII: Adv Analysis 1	Room 7
109.	GEOTECH VI: Piles & Foundations	Room 8
110.	OFFSHORE MECHANICS VI: Design & Installation	Room 9
111.	LNG SLOSHING VIII: Panel	Room 10

19:00	Super Dome Pool
Annual Conference Banquet	
22nd ISOPE Cultural Event, Best Paper, Best Student Paper, Outstanding Students and Awards	
<i>Don't forget the banquet ticket.</i>	

THURSDAY JUNE 21

07:30 Session Chair/Co-chair Briefing Lobby

08:00

112. RENEWABLE ENERGY XX: Tidal & Current 2	Room 1
113. HYDRODYNAMICS IX: CFD 1	Room 2
114. RENEWABLE ENERGY XII: Wind 12:	Room 3
115. ADVANCED SHIP TECH IV: Slamming & Load	Room 4
116. HPM VI: Fatigue & Fracture 3	Room 5
117. COASTAL IX: Coastal Sediment 1	Room 6
118. SUBSEA, PIPELINES, RISERS VIII: Install. & Fabric	Room 7
119. GEOTECH VII: Consolidation & Seepage	Room 8
120. OFFSHORE MECHANICS VII: Moored Structures	Room 9
121. ARCTIC V: Ice Structure Interaction	Room 10

10:30

122. RENEWABLE ENERGY XXI: Tidal & Current 3	Room 1
123. HYDRODYNAMICS X: CFD 2	Room 2
124. RENEWABLE ENERGY XIII: Wave 1	Room 3
125. ADVANCED SHIP TECH V: Propulsion	Room 4
126. HPM VII: Shipbuilding Steels	Room 5
127. COASTAL X: Coastal Sediment 2	Room 6
128. SUBSEA, PIPELINES, RISERS IX: Analysis 2	Room 7
129. GEOTECH VIII: Material Testing	Room 8
130. OFFSHORE MECHANICS VIII: FSRU 1	Room 9
131. ARCTIC VI: Operations in Ice)	Room 10

12:00 Ocean Mining Executive Committee Executive D

14:00

132. RENEWABLE ENERGY XXII: Thermal Energy	Room 1
133. HYDRODYNAMICS XI: CFD 3	Room 2
134. RENEWABLE ENERGY XIV: Wave 2	Room 3
135. ADVANCED SHIP TECH VI: System design	Room 4
136. HPM VIII: Advances in Welding Technology 1	Room 5
137. COASTAL XI: Coastal Sediment 3	Room 6
138. SUBSEA, PIPELINES, RISERS X: Flow Effects	Room 7
139. GEOTECH IX: Soil Properties	Room 8
140. OFFSHORE MECHANICS IX: FSRU 2	Room 9
141. ARCTIC VII: Ice Modeling & Operations	Room 10

16:20

142. RENEWABLE ENERGY XXIII: Marine Bioenergy	Room 1
143. HYDRODYNAMICS XII: CFD 4	Room 2
144. RENEWABLE ENERGY XV: Wave 3	Room 3
145. ADVANCED SHIP TECH VII: Seakeeping & Resist.	Room 4
146. HPM IX: Advances in Welding Technology 2	Room 5
147. COASTAL XII: Storm Surge & Inundation	Room 6
148. SUBSEA, PIPELINES, RISERS XI: System Integrity	Room 7
149. GEOTECH X: Construction & Materials	Room 8
150. OFFSHORE MECHANICS X: LNG Transport	Room 9

Sunday – Thursday	
Author Practice On-site Registration ISOPE Headquarters Proceedings Pickup Committee Meetings	Individual session rooms Lobby VIP Lounge Registration Desk, Lobby Executive D, Mezzanine e

FRIDAY June 22

Find Updates in Program on www.isopec.org and www.isopec2012.org
 Tours: Click on [General Information](#)

ISOPE-2012 Rhodes
The Twenty-second (2012) International
Offshore and Polar Engineering Conference
Rhodes, Greece, June 17–22, 2012

This 22nd annual conference features **150 technical and opening general sessions**, **1 plenary presentation** and **4 keynote presentations** with top experts from industry, academia and government. After peer review of the manuscripts selected from 1,250+ abstracts, some **720** peer-reviewed papers will be presented and discussed by researchers, engineers and managers from more than **52** countries.

The conference proceedings of peer-reviewed papers in PDF files will be available in a set of 4 volumes on CD-ROM (4,200 pp. est.) — paginated within each volume — during the conference and later for worldwide post-conference mail order from ISOPE: **ISBN 978-1-880653-94-4; ISSN 1098-6189**.

The number at end of the session title indicates the tentative number of the proceedings volume. Only the changes on titles or authors the Technical Program Committee received in writing before January 19, 2012 are reflected in this program. Final corrections will be updated in the Conference Proceedings of peer-reviewed papers and the Final Program.

All ISOPE publications are indexed by Engineering Index (EI).

SESSION LIST BY TOPICS

OCEAN AND ENERGY INDUSTRY REVIEW (V. 1)

1. OCEAN AND ENERGY INDUSTRY REVIEW—2011 Jupiter

FRONTIER ENERGY, GAS HYDRATES & OCEAN MINING (V. 1)

9. FRONTIER ENERGY I: Clean Energy	Room 8
19. FRONTIER ENERGY II: Clean Coal	Room 8
29. FRONTIER ENERGY III: Hydrate Fundamental	Room 8
39. FRONTIER ENERGY IV: Hydrate Development	Room 8
49. FRONTIER ENERGY V: Hydrate Modeling	Room 8
80. FRONTIER ENERGY VI: Ocean Mining 1: Minerals	Room 9
90. FRONTIER ENERGY VII: Ocean Mining 2: Systems	Room 9

**RENEWABLE ENERGY (OFFSHORE WIND AND OCEAN)
AND ENVIRONMENT (V. 1)**

4. RENEWABLE ENERGY I: Wind 1: Foundations 1	Room 3
14. RENEWABLE ENERGY II: Wind 2: Foundations 2	Room 3
24. RENEWABLE ENERGY III: Wind 3: Substructures	Room 3
34. RENEWABLE ENERGY IV: Wind 4: Dynamics 1	Room 3
44. RENEWABLE ENERGY V: Wind 5: Floating 1	Room 3
54. RENEWABLE ENERGY VI: Wind 6: Floating 2	Room 3
64. RENEWABLE ENERGY VII: Wind 7: Analysis Tools	Room 3
74. RENEWABLE ENERGY VIII: Wind 8: Concepts	Room 3
84. RENEWABLE ENERGY IX: Wind 9: Codes & Design	Room 3
94. RENEWABLE ENERGY X: Wind 10: Resources	Room 3
104. RENEWABLE ENERGY XI: Wind 11: Power 4	Room 3
114. RENEWABLE ENERGY XII: Wind 12:	Room 3
124. RENEWABLE ENERGY XIII: Wave 1	Room 3
134. RENEWABLE ENERGY XIV: Wave 2	Room 3
144. RENEWABLE ENERGY XV: Wave 3	Room 3
72. RENEWABLE ENERGY XVI: Wave 4	Room 1
82. RENEWABLE ENERGY XVII: Wave 5	Room 1
92. RENEWABLE ENERGY XVIII: Wave 6: Resources	Room 1
102. RENEWABLE ENERGY XIX: Tidal & Current 1	Room 1
112. RENEWABLE ENERGY XX: Tidal & Current 2	Room 1
122. RENEWABLE ENERGY XXI: Tidal & Current 3	Room 1
132. RENEWABLE ENERGY XXII: Thermal Energy	Room 1
142. RENEWABLE ENERGY XXIII: Marine Bioenergy	Room 1

7. ENVIRONMENT I: Oil Spill and Emission Room 6

17. ENVIRONMENT II: Physical & Chemical Processes	Room 6
27. ENVIRONMENT III: Water & Sediment Qualities	Room 6

OFFSHORE MECHANICS AND HYDRODYNAMICS (V. 1)

40. OFFSHORE MECHANICS I: Floating Dynamics 1	Room 9
50. OFFSHORE MECHANICS II: Floating Dynamics 2	Room 9
60. OFFSHORE MECHANICS III: Systems I	Room 9
70. OFFSHORE MECHANICS IV: Systems II	Room 9
100. OFFSHORE MECHANICS V: Deepwater Installation	Room 9
110. OFFSHORE MECHANICS VI: Design & Installation	Room 9
120. OFFSHORE MECHANICS VII: Moored Structures	Room 9
130. OFFSHORE MECHANICS VIII: FSRU 1	Room 9
140. OFFSHORE MECHANICS IX: FSRU 2	Room 9
150. OFFSHORE MECHANICS X: LNG Transport	Room 9

GEOTECHNICAL ENGINEERING (V. 2)

59. GEOTECH I: Suction Piles	Room 8
69. GEOTECH II: Offshore Foundations	Room 8
79. GEOTECH III: Soil Improvement	Room 8
89. GEOTECH IV: Cyclic Loading	Room 8
99. GEOTECH V: Slope Stability	Room 8
109. GEOTECH VI: Piles & Foundations	Room 8
119. GEOTECH VII: Consolidation & Seepage	Room 8
129. GEOTECH VIII: Material Testing	Room 8
139. GEOTECH IX: Soil Properties	Room 8
149. GEOTECH X: Construction & Materials	Room 8

SUBSEA, PIPELINES AND RISERS (V. 2)

PLENARY: PNG PIPELINE	Room 7
48. SUBSEA, PIPELINES, RISERS I: NORD Stream	Room 7
58. SUBSEA, PIPELINES, RISERS II: New Concept Development	Room 7
68. SUBSEA, PIPELINES, RISERS III: Panel	Room 7
78. SUBSEA, PIPELINES, RISERS IV: Improved Perform.	Room 7
88. SUBSEA, PIPELINES, RISERS V: Component Develop	Room 7
98. SUBSEA, PIPELINES, RISERS VI: Fatigue Assessment	Room 7
108. SUBSEA, PIPELINES, RISERS VII: Adv Analysis 1	Room 7
118. SUBSEA, PIPELINES, RISERS VIII: Install. & Fabric	Room 7
128. SUBSEA, PIPELINES, RISERS IX: Analysis 2	Room 7
138. SUBSEA, PIPELINES, RISERS X: Flow Effects	Room 7
148. SUBSEA, PIPELINES, RISERS XI: System Integrity	Room 7

UNDERSEA VEHICLE, COMMUNICATION AND CONTROL (V. 2)

11. UNDERSEA I: Operation and Communication 1	Room 10
21. UNDERSEA II: Operation and Communication 2	Room 10
31. UNDERSEA III: Vehicle and Control 1	Room 10
41. UNDERSEA IV: Vehicle and Control 2	Room 10

ARCTIC SCIENCE & TECHNOLOGY (V. 1)

71. ARCTIC I: Navigation in Pack Ice	Room 10
81. ARCTIC II: Ice Mechanics	Room 10
91. ARCTIC III: Coastal Arctic Properties	Room 10
101. ARCTIC IV: Ice Environment & Forecasting	Room 10
121. ARCTIC V: Ice Structure Interaction	Room 10
131. ARCTIC VI: Operations in Ice)	Room 10
141. ARCTIC VII: Ice Modeling & Operations	Room 10

ARCTIC MATERIALS (V. 4)

51. ARCTIC MATERIALS I	Room 10
61. ARCTIC MATERIALS II	Room 10

HYDRODYNAMICS (V. 3)

23. HYDRODYNAMICS I: MetOcean 1	Room 2
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33. HYDRODYNAMICS II: MetOcean 2	Room 2
43. HYDRODYNAMICS III: MetOcean 3	Room 2
53. HYDRODYNAMICS IV: Freak and Long Waves	Room 2
63. HYDRODYNAMICS V: Wave Loading	Room 2
73. HYDRODYNAMICS VI: Floating-Body Dynamics 1	Room 2
83. HYDRODYNAMICS VII: Floating-Body Dynamics 2	Room 2
93. HYDRODYNAMICS VIII: Floating-Body Dynamics 3	Room 2
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113. HYDRODYNAMICS IX: CFD 1	Room 2
123. HYDRODYNAMICS X: CFD 2	Room 2
133. HYDRODYNAMICS XI: CFD 3	Room 2
143. HYDRODYNAMICS XII: CFD 4	Room 2

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5. TSUNAMI I: 2011 Tohoku Tsunami 1	Room 4
15. TSUNAMI II: 2011 Tohoku Tsunami 2	Room 4
25. TSUNAMI III: Generation & Warning 1	Room 4
35. TSUNAMI IV: Generation & Warning 2	Room 4
45. TSUNAMI V: Generation & Warning 3	Room 4
55. TSUNAMI VI: Propagation & Flooding	Room 4
65. TSUNAMI VII: Structure & Sediment 1	Room 4
75. TSUNAMI VIII: Structure & Sediment 2	Room 4
85. TSUNAMI IX: Risk Assessment 1	Room 4
95. TSUNAMI X: Risk Assessment 2	Room 4

SLOSHING DYNAMICS AND DESIGN (V. 3)

2. LNG SLOSHING I: GTT Progress	Room 1
12. LNG SLOSHING II: Physics & Coupling	Room 1
22. LNG SLOSHING III: LNG Tank Design 1	Room 1
32. LNG SLOSHING IV: LNG Tank Design 2	Room 1
42. LNG SLOSHING V: Sloshing Tests	Room 1
52. LNG SLOSHING VI: CFD	Room 1
62. LNG SLOSHING VII: Structural Responses	Room 1
111. LNG SLOSHING VIII: Panel	Room 10

FLOW-INDUCED VIBRATIONS (V. 3)

3. VORTEX-INDUCED VIBRATIONS I	Room 2
13. VORTEX-INDUCED VIBRATIONS II	Room 2

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37. COASTAL I: Waves & Modeling 1	Room 6
47. COASTAL II: Waves & Modeling 2	Room 6
57. COASTAL III: Waves & Modeling 3	Room 6
67. COASTAL IV: Breakwaters & Waves 1	Room 6
77. COASTAL V: Breakwaters & Waves 2	Room 6
87. COASTAL VI: Breakwaters & Waves 3	Room 6
97. COASTAL VII: Wave-Structure Interaction	Room 6
107. COASTAL VIII: Estuary Hydraulics	Room 6
117. COASTAL IX: Coastal Sediment 1	Room 6
127. COASTAL X: Coastal Sediment 2	Room 6
137. COASTAL XI: Coastal Sediment 3	Room 6
147. COASTAL XII: Storm Surge & Inundation	Room 6

HIGH-PERFORMANCE MATERIALS (V. 4)

66. HPM I: Adv Materials & Structures 1	Room 5
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86. HPM III: Composites	Room 5
96. HPM IV: Fatigue & Fracture 1	Room 5
106. HPM V: Fatigue & Fracture 2	Room 5
116. HPM VI: Fatigue & Fracture 3	Room 5
126. HPM VII: Shipbuilding Steels	Room 5
136. HPM VIII: Advances in Welding Technology 1	Room 5
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ASSET INTEGRITY (V. 4)

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16. ASSET INTEGRITY II	Room 5
26. ASSET INTEGRITY III	Room 5
36. ASSET INTEGRITY IV	Room 5

STRAIN-BASED DESIGN (V. 4)

8. SBD I: Materials	Room 7
18. SBD II: Numerical Modeling	Room 7
28. SBD III: Strain Capacity Characterization	Room 7
38. SBD IV: Fracture Mechanics	Room 7

RISK & RELIABILITY (V. 4)

10. RISK & RELIABILITY I	Room 9
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30. RISK & FATIGUE	Room 9

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56. ADVANCED SHIP TECH II: At-Sea Explosions	Room 5
105. ADVANCED SHIP TECH III: Collision & Vibration	Room 4
115. ADVANCED SHIP TECH IV: Slamming & Load	Room 4
125. ADVANCED SHIP TECH V: Propulsion	Room 4
135. ADVANCED SHIP TECH VI: System design	Room 4
145. ADVANCED SHIP TECH VII: Seakeeping & Resist.	Room 4

ISOPE-2012 Conference Technical Program Committee (TPC)

Dr. O. M. Akselsen, SINTEF, Trondheim, Norway
 Prof. D.C. Angelides (Co-Chair), Aristotle Univ of Thessaloniki, Greece
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TECHNICAL PROGRAM

The Twenty-second (2012) International Offshore and Polar Engineering Conference Rhodes, Greece, June 17–22, 2012

The number at end of the session title indicates the tentative number of the proceedings volume. Only the changes on titles or authors the ISOPE-2012 Technical Program Committee (TPC) received in writing before January 19, 2012 are reflected in this program. Final corrections will be updated in the Conference Proceedings of peer-reviewed papers and the Final Program. Conference proceedings (ISBN 978-1-880653-94-4; ISSN 1098-6189) will be available as a set of 4 volumes (4,200 pp. est.) from ISOPE during and after the Conference. Proceedings papers are indexed by Engineering Index and Compendex and others.

SUNDAY, June 17 Conference Reception

17:00

Outdoor Pool Garden

RENEWABLE ENERGY (OFFSHORE WIND AND OCEAN) (V. 1)

4. RENEWABLE ENERGY I: Offshore Wind 1: Foundations 1 (V. 1)
Monday June 18 10:30 Room 3

Chair: I. Langen, Univ of Stavanger, Norway,

Design of Piles for Offshore Wind Energy Foundations with Respect to Horizontal Loading

M Achmus, K Abdel-Rahman, Leibniz Univ Hannover, Germany

A Device to Measure Lateral Behavior for Offshore Wind Energy Foundations

JY Lee, Korea Inst of Construction Tech; YE Jang, Univ of Science & Tech; CH Choi, Korea Inst of Construction Tech, Korea

Quantification of Damping Due to Pore Water Flow in the Soil Around a Monopile Foundation for a Wind Turbine Subject to Cyclic Motion

M Bayat, LV Andersen, LB Ibsen, SRK Nielsen, Aalborg Univ, Denmark

CPTu-Based Geotechnical Site Assessment for Offshore Wind Turbines - A Case Study from the Frederikshavn Site in Denmark

S Firouzianbandpey, LB Ibsen, LV Andersen, Aalborg Univ, Denmark

Local Scour and Pore-Water Pressure around a Monopile Foundation for Wind-Turbines under Combined Waves and Currents

FP Gao, WG Qi, XT Han, QX Gong, Inst of Mechanics, CAS, China

14. RENEWABLE ENERGY II: Offshore Wind 2: Foundations 2

(V. 1)

Monday **June 18** **14:00** Room 3

Chair: G Paulsen, FEDEM Technology, Norway

Co-Chair: M Achmus, Leibniz Univ Hannover, Germany

Buckling of Bucket Foundations - Sensitivity to Shape Imperfections during Installation

S Madsen, LV Andersen, LB Ibsen, Aalborg Univ, Denmark

Scour Evolution around Offshore Transition Pieces on Bucket Foundations

A Nezhentseva, TL Andersen, LV Andersen, LB Ibsen, Aalborg Univ, Denmark

Design and Installation of Small-Scale Monopod Suction Pile and Tripod Suction Buckets for Offshore Wind Farms

SC Bang, South Dakota School of Mines & Tech, USA; DJ Kwag, ADVACT; MH Oh, OS Kwon, KORDI; YS Choi, ADVACT, Korea

Relative Density of Backfilled Soil Material around Monopiles for Offshore Wind Turbines

SPH Sørensen, LB Ibsen, Aalborg Univ, Denmark

Drivability of Large-diameter Piles with Submerged Conical Sections

G Barauskis, F Jakobsen, LICEngineering, Denmark

Numerical Simulation of Soil Extrusion Effects of Large-Diameter Steel Pipe Piles in Offshore Wind Fields

K Liu, M Yang, Tongji Univ, China

A Numerical Approach for Determination of Lateral Stiffness Considering Soil-Foundation Interaction in Offshore Wind Energy System

YE Jang, Univ of Science & Tech; CH Choi, JY Lee, Korea Inst of Construction Tech, Korea

24. RENEWABLE ENERGY III: Offshore Wind 3: Substructures

(V. 1)

Monday **June 18** **16:20** Room 3

Chair: F Vorpahl, Fraunhofer-IWES, Germany

Development Status Quo of Korea Offshore Wind Foundations

JH Kim, CH Choi, SD Cho, Korea Inst of Construction Tech, Korea

Fatigue Analysis of a Tripod Support Structure of an Offshore Wind Turbine

F Zacharioudaki-Apelidou, F Dedonakis, DC Angelides, Aristotle Univ of Thessaloniki, Greece

Modeling Offshore Wind Turbine Substructures Using a Parametric Approach

M Strach, Fraunhofer Inst for Wind Energy IWES, Germany; M Brommundt, NTNU, Norway; F Vorpahl, Fraunhofer Inst for Wind Energy IWES, Germany

A Suggestion for the Foundation Type of Offshore Wind Turbine in the Test Bed on the Basis of Economic and Constructability Analysis

MS Ryu, KS Kang, JS Lee, Korea Electric Power Research Inst, Korea

Study on a New Methodology Proposed to Install a Monopile

A Sarkar, OT Gudmestad, Univ of Stavanger, Norway

A Probabilistic 3D Model of an Offshore Wind Turbine Foundation

M Vahdatirad, LV Andersen, LB Ibsen, J Clausen, JD Sørensen, Aalborg Univ, Denmark

A Design of Windmill Turbine Installation Vessel Using Jack-up System

YK Kim, JH Woo, NG Mun, Daewoo Shipbldg & Marine Engineering, Korea

34. RENEWABLE ENERGY IV: Offshore Wind 4: Dynamics 1 (V.

Tuesday **June 19** ¹⁾ **08:00** Room 3

Chair: TJ Larsen, RISØ/DTU, Denmark

Resonance Frequency Estimation of Offshore Wind Turbine Structures

M Damgaard, JB de Place, LV Andersen, LB Ibsen, Aalborg Univ; JKF Andersen, Vestas Technology, Denmark

Time-History Analysis of a 600kW Wind Turbine under Wenchuan Seismic Excitation

L Zhu, Beijing Univ of Civil Engineering & Architecture; ZX Ye, Tsinghua Univ, China

Dynamic Analysis of Fixed-Bottom Offshore Wind Turbines

E Loukogeorgaki, AG Throumoulopoulos, AK Dimitriou, DC Angelides, Aristotle Univ of Thessaloniki, Greece

Effects of Non-Linear Wave Forces on Dynamic Response of Floating Offshore Wind Platforms

S Jagdale, QW Ma, City Univ London, UK

Fatigue Behaviour of Load-Bearing Structures for Offshore Wind Energy Converters - Numerical and Experimental Investigations

P Weidner, T Ummenhofer, Karlsruhe Inst of Tech, Germany

Aero-Elastic-Control-Floater-Mooring Coupled Dynamic Analysis for a TLP-Type FOWT (Floating Offshore Wind Turbine)

YH Bae, MH Kim, Texas A&M Univ, USA; JK Heo, STX Inst of Tech; SW Im, RIST/POSCO, Korea

Offshore Wind Profile and Fatigue Life of Offshore Wind Turbines

L Eliassen, JB Jasna, Univ of Stavanger, Norway

On the Impact of Controllers on Reliability of the Wind Turbines

M Teimouri Sichani, Aalborg Univ, Denmark

44. RENEWABLE ENERGY V: Offshore Wind 5: Floating 1 (V. 1)
Tuesday June 19 10:30 Room 3

Chair: JD. Sørensen, Aalborg Univ, Denmark
Co-Chair: PE Thomassen, NTNU, Norway

Study of Floating Foundations for Wind Turbines
S Gueydon, MARIN, Netherlands

Mooring Effects on Dynamic Behavior of Sub-structure for Floating type Offshore Wind Turbine System
CY Song, JH Cha, CI Moon, Mokpo National Univ, Korea

Experimental Study on a Single-Point-Mooring Floating Structure
CC Huang, MF Lee, National Sun Yat-sen Univ, Taiwan, China

Development of Surface Current Observation System Using GPS Sensor Network and its Application to a Bathing Beach
A Myhr, Norwegian Univ of Life Sciences; TA Nygaard, Inst for Energy Tech, Norway

Linear and Nonlinear Analysis of Tension Leg Platform Wind Turbines
EE Bachynski, T Moan, NTNU, Norway

Yaw Stability of a 3-Bladed Wind Turbine
T Bracchi, P-E Krogstad, NTNU, Norway

The Wind-Wave Tunnel Test of a New Offshore Floating TLP Wind Turbine with Mooring Lines
NX Ren, Harbin Inst of Tech; YG Li, JP Ou, Dalian Univ of Tech, China

54. RENEWABLE ENERGY VI: Offshore Wind 6: Floating (V. 1)
Tuesday June 19 14:00 Room 3

Chair: J Jonkman, National Renewable Energy Lab, USA
Co-Chair: TJ Larsen, RISØ/DTU, Denmark

Response Analysis of a Parked Spar-Type Wind Turbine under Different Environmental Conditions and Blade Pitch Mechanism Fault
ZY Jiang, M Karimirad, T Moan, NTNU, Norway

Modelling and Analysis of Semi-submersible Wind Turbine
MI Kvittem, T Moan, NTNU, Norway

Time Domain Analysis of the Spar-Type Floating Offshore Platform for Various Platform Geometries and Mooring Points
JY Go, SK Lee, DJ Kim, YJ You, KP Rhee, Seoul National Univ, Korea

Model Test of Floating Offshore Wind Turbine Moored by a Spring-TLP
HK Shin, Univ of Ulsan, Korea

Experimental Validation for Motion of SPAR-type Floating Wind Turbine at Severe Condition with Affect of Gyro moment of the Rotating Blade of Windmill

MNE Mostafa, M Murai, R Nishimura, O Fujita, Yokohama National Univ,
Japan

64. RENEWABLE ENERGY VII: Offshore Wind 7: Analysis Tools
(V. 1)
Tuesday June 19 16:20 Room 3

Chair: E Loukogeorgaki, Aristotle Univ of Thessaloniki, Greece

**Offshore Code Comparison Collaboration Continuation (OC4), Phase I
- Results of Coupled Simulation of Offshore Wind Turbine with Jacket
Support Structure**

W Popko, IWES, Germany; J Jonkman, A Robertson, NREL, USA; TJ
Larsen, RISØ/DTU, Denmark; K Sftertrix, KM Okstad, Fedem Technology,
Norway; J Nichols, Garrad Hassan & Partners, UK; TA Nygaard, Inst for
Energy Tech, Norway; W Shi, HC Park, POSTECH, Korea; Z Gao, NTNU,
Norway, D Manolas, NTUA, Greece; A Basquez-Rojas, J Dubois, Leibniz
Univ Hannover, Germany; M Kohlmeier, IWES, Germany; A Yde,
RISØ/DTU, Denmark; D Kaufer, Univ Stuttgart, Germany; MJ de Ruiter,
WMC, Netherlands; J Peeringa, ECN, Netherlands; K Kim, ABC, USA; H
von Waaden, Repower Systems, Germany

**A Numerical Tool for the Integrated Analysis of Fixed-Bottom Offshore
Wind Turbines**

E Loukogeorgaki, DC Angelides, Aristotle Univ of Thessaloniki, Greece

**FAST Code Verification of Scaling Laws for DeepCwind Floating Wind
System Tests**

A Jain, NREL/Texas Tech Univ; A Robertson, JM Jonkman, National
Renewable Energy Lab; A Goupee, Univ of Maine; R Kimball, Marine
Maritime Academy; A Swift, Texas Tech Univ, USA

**Global Analysis of Floating Wind Turbines: Code Development, Model
Sensitivity and Benchmark Study**

H Ormberg, MARINTEK; EE Bachynski, NTNU, Norway

**A Novel Tool for Fem Analysis of Offshore Wind Turbines with
Innovative Visualization Techniques**

PE Thomassen, NTNU, Norway

**Calibration and Validation of a FAST Floating Wind Turbine Model of
the DeepCwind Scaled Tension-Leg Platform**

G Stewart, Univ of Massachusetts; A Robertson, J Jonkman, National
Renewable Energy Lab; M Lackner, Univ of Massachusetts; A Goupee,
Univ of Maine, USA

**Validation of a Fast Panel Vortex Code for Wind Turbines
Implemented on a General Purpose Graphics Processor Unit**

L Eliassen, Univ of Stavanger; M Muskulus, NTNU, Norway

72. RENEWABLE ENERGY XVI: Wave Energy 4 (V. 1)
Wednesday June 20 08:00 Room 1

Chair: F Dias, University College Dublin, Ireland

Co-Chair: KY Hong, Maritime & Ocean Eng Research Inst, Korea

Design, Modelling and Analysis of an Integrated Mooring System for Wave Energy Arrays

P Ricci, A Rico, P Ruiz-Minguela, Tecnalia, Spain

A Case Study of Short-Term Wave Forecasting based on FIR Filter: Optimization of the Power Production for the Wavestar Device

F Francesco, ST Mahdi, P Frigaard, Aalborg Univ, Denmark

Multi Objective Optimization Performance of a Floating Flexible System

CE Michailides, DC Angelides, Aristotle Univ of Thessaloniki, Greece

Control Influenced Layout Optimization of an Array of Wave Energy Converters

P Balitsky, G Bacelli, J Ringwood, National Univ of Ireland Maynooth, Ireland

Characteristics of the Electrical Power Output Generated by Float-Counterweight Type Wave Power Generation System

K Taneura, CTI Engineering; P Koirala, K Hadano, Yamaguchi Univ; H Matsuzaki, CTI Engineering, Japan

Procedure for the Economic Feasibility Assessment of Wave Energy Projects

B Teillant, R Costello, J Ringwood, National Univ of Ireland Maynooth, Ireland

How Experiences from the Offshore Wind Industry Can Aid Development of the Wave Energy Sector: Lessons Learned from EIA

D Magagna, DM Greaves, D Conley, Univ of Plymouth, UK AMG O'Hagan, B Holmes, Univ College Cork, Ireland; C McClellan, Univ of Exeter, UK; T Simas, Wave Energy Centre, Portugal; C Huertas Olivares, Inabesa, ABENGOA, Spain; J Chambel Leitao, Hidromod Ltd, Portugal; H Mouslim, Ecole Centrale de Nantes, France; Y Torre-Enciso, Ente Vasco de la Energia, Spain; J Sundberg, Univ of Uppsala, Sweden; N Rosseau, European Ocean Energy Association, Belgium

74. RENEWABLE ENERGY VIII: Offshore Wind 8: Concepts (V. 1)
Wednesday June 20 08:00 Room 3

Chair: T Ummerhofer, Karlsruhe Inst of Tech, Germany

Lift of a Rotating Circular Cylinder in Unsteady Flows

S Carstensen, X Mandviwalla, DHI; L Vita, US Paulsen, Risø/DTU, Denmark

The WindX Offshore Wind Turbine Concept

EJ Augestad, Det Norske Veritas, Norway

Heave Restrained Wind Turbine Conceptual Designs Suitable for a Wide Range of Water Depths

RW Copple, C Capanoglu, International Design, Engineering & Analysis Services, USA

Intelligent Wind Power Unit with Tandem Rotors Applicable to Offshore Wind Farm (Flow and Performance Simulation of Tandem Wind Rotors)

Y Usui, T Kanemoto, Kyushu Inst of Tech, Japan

Design and Analysis of a Novel Concept Floating Wind Power Platform

SY Hong, JH Kim, SW Hong, KORDI; HJ Kim, SHI, Korea

Modeling of Tower Influence for a Full-height Truss Tower Wind Turbine with the Source Panel Method

L Krause, M Muskulus, NTNU, Norway

Scalable and Customer Oriented Life Cycle Costing Model: A Comparative Case Study of an Innovative Vertical Wind Turbine Concept

I El-Thalji, VTT Technical Research Centre of Finland, Finland; JP Liyanage, Univ of Stavanger; M Hjøllø, Ambientor AS, Norway

Micro Wind Energy Converter for Powering Wireless Sensors

SD Kwon, SH Lee, KM Kim, Chonbuk National Univ, Korea

82. RENEWABLE ENERGY XVII: Wave Energy 5 (V. 1)

Wednesday June 20 10:30 Room 1

Chair: BS Hyun, Korea Maritime Univ, Korea

Co-Chair: A Grilli, Univ of Rhode Island, USA

Use of a Rectangular Liquid-Filled Bottom-Mounted Distensible Device to Harness Nearshore Wave Power

N Choplain, Univ of Southampton, UK

Experimental Study Seeking Optimal Geometry of a Heaving Body for Improved Power Absorption Efficiency

RE Hager, N Fernandez, MH Teng, Univ of Hawaii, USA

Control and Monitoring Application for 50kW Class Wave Energy Converter

SY Park, BY Cho, DS Yang, KS Choi, Korea Electric Power Research Inst, Korea

Performance Analysis on Wave Energy Converter Arrays

SQ Qiu, JW Ye, DJ Wang, FL Liang, South China Univ of Tech, China

The Oscillating Wave Surge Converter in an Open Channel

L O'Brien, E Renzi, F Dias, Univ College Dublin, Ireland

Is Biofouling a Critical Issue for Wave Energy Converters?

R Tiron, Univ College Dublin, Ireland; C Pinck, Ecole Polytechnique, France; EG Reynaud, F Dias, Univ College Dublin, Ireland

84. RENEWABLE ENERGY IX: Offshore Wind 9: Standards, Design (V. 1)

Wednesday June 20 10:30 Room 3

Chair: C Capanoglu, I.D.E.A.S., Inc., USA

Co-Chair: TA Nygaard, Inst for Energy Tech, Norway

Design Standard for Floating Wind Turbine Structures

KO Ronold, ALH Hopstad, Det Norske Veritas, Norway

Experience with the Certification of Offshore Wind Farms in Europe

T Faber, Flensburg Univ of Applied Sciences, Germany

State-of-the-art Comparison of Standards in Terms of Dominant Sea Ice Loads for Offshore Wind Turbines Support Structures in the Baltic Sea

W Popko, Fraunhofer Inst for Wind Energy; Germany; J Heinonen, VTT Technical Research Centre of Finland, Finland

Grouted Connections - Offshore Standards Driven by the Wind Industry

M Klose, M Mittelstaedt, Germanischer Lloyd ; P Schaumann, L Lohaus, Leibniz Univ Hannover, Germany

A Design Procedure for Foundations Supported Offshore Wind Energy Systems

CH Choi, Korea Inst of Construction Tech; SR Kim, Dong-A Univ; YE Jang, Univ of Science & Tech, Korea

A Review of Current Guidelines to Determine Wind Design Parameters for Offshore Wind Turbines

C Obhrai, S Kalvig, OT Gudmestad, Univ of Stavanger, Norway

Identification and Evaluation of RAMS+I Factors Affecting the Value Added by Different Offshore Wind Turbine Concepts in Nordic Context

R Tiusanen, J Jannes, VTT Technical Research Centre of Finland, Finland; JP Liyanage, Univ of Stavanger, Norway

92. RENEWABLE ENERGY XVIII: Wave Energy 6: Ocean Resources (V. 1)

Wednesday June 20 14:00 Room 1

Chair: MH Teng, Univ of Hawaii, USA

Experimental Investigation of Wave Transmission from a Floating Wave Dragon Wave Energy Converter

J Nørgaard, TL Andersen, Aalborg Univ, Denmark

Estimation of Wave Conditions Close to the Danish Wave Energy Centre at Hanstholm Harbour, Using the Numerical Model MILDwave

V Stratigaki, P Troch, Ghent Univ, Belgium; L Margheritini, JP Kofoed, Aalborg Univ, Denmark

Wind and Wave Potential in Offshore Locations of the Greek Seas

TH Soukissian, D Fytilis, A Papadopoulos, G Korres, A Prospathopoulos, Hellenic Centre for Marine Research; NS Gizari, National Tech Univ of Athens, Greece

3D Numerical Simulation of LMMHD for Wave Energy Conversion

YZ Hu, Y Peng, C Ye, Inst of Electrical Engineering, CAS, China

The Force of a Tsunami on a Wave Energy Converter

L O'Brien, Univ College Dublin, Ireland; P Christodoulides, Cyprus Univ of Tech, Cyprus; D Dutykh, Univ of Savoie, France; F Dias, UCD, Ireland/ENS-Cachan, France

Effect of Viscous Forces on the Performance of a Surging Wave Energy Converter

MA Bhinder, A Babarit, L Gentaz, P Ferrant, Ecole Centrale de Nantes, France

Hydrodynamic Loading on a Bottom Hinged Oscillating Wave Surge Converter

PM Schmitt, S Bourdier, Queen's Univ Belfast, UK; D Sarkar, E Renzi, F Dias, Univ College Dublin, Ireland; K Doherty, J van't Hoff, Aquamarine Power; T Whittaker, Queen's Univ Belfast, UK

94. RENEWABLE ENERGY X: Offshore Wind 10: Resources (V. 1)

Wednesday June 20 14:00 Room 3

Chair: AC Mendes, Universidade da Beira Interior, Portugal

Fit and the Development of Offshore Wind Energy in Taiwan

KJ Hsu, Univ of Kang Ning, Taiwan, China

Meteocean Data Requirements for Near-shore Wave Modelling

SM Lengden, G Bryans, Aquamarine Power, UK

Validation of a Markov-based Weather Model for Simulation of O&M for Offshore Wind Farms

M Scheu, NTNU, Norway/ Univ of Stuttgart, Germany; M Muskulus, NTNU, Norway; D Matha, Univ of Stuttgart, Germany

Generic Extreme Sea State Conditions - An Engineering Approach

C Wehmeyer, J Skourup, Rambøll A/S, Denmark

Nearshore Wave Climate: A Focus on the West Coast of Ireland

S Gallagher, R Tiron, F Dias, Univ College Dublin, Ireland

Offshore Wind Farm Siting: Design of a Test Bed in Rhode Island Coastal Waters

A Grilli, S Hansel, C O'Reilly, Univ of Rhode Island, USA

Scoping for Marine Environmental Impact of Offshore Wind Farms Construction

KH Eom, GY Kim, DI Lee, National Fisheries Research & Development Inst, Korea

Multi-Body System Analysis for Optimizing Offshore Wind Power System

JS Lee, SJ Baik, S Kondaraju, Yonsei Univ; SK Na, POSCO, Korea

102. RENEWABLE ENERGY XIX: Tidal & Current Energy 1 (V. 1)

Wednesday June 20 16:20 Room 1

Chair: Q Xiao, Univ of Strathclyde, UK

Co-Chair: MC Kim, Pusan National Univ, Korea

Fundamental Study on Tidal Currents in Obatake Seto from Viewpoint of Tidal Energy Generation

K Sasa, Hiroshima National College of Maritime Tech; S Shimizu, M Fujii, E Koga, Oshima National College of Maritime Tech, Japan

Preliminary Numerical Estimates on Tidal Stream Energy Resources of the Coastal Areas of Shandong Peninsula

BC Liang, LL Yang, GX Wu, Ocean Univ of China, China

Characterisation of Marine Turbulence Using ADCP Field Measurements

I Masters, M Togneri, Swansea Univ, UK

A Numerical Wave Channel for the Design of Offshore Structures with Consideration of Wave-Current Interaction

D Markus, R Wüchner, K-U Bletzinger, TU München, Germany

Evaluation of Flow around Circular Cylinder at Reynolds Numbers for Tidal Energy Device Applications: Commercial and Open Source URANS Solvers

RM Stringer, J Zang, Univ of Bath, UK

Simulation of the Impact of a Tidal Current Turbine on the Seabed in Shallow Waters

L Vybulkova, Univ of Glasgow; RE Brown, Univ of Strathclyde; H Karunarathna, M Veza, Univ of Glasgow, UK

A Lattice Boltzmann - Immersed Boundary Method for Simulating Design Tidal Turbine Loads and Optimazition

JS Lee, JY Moon, S Kondaraju, Yonsei Univ, Korea

104. RENEWABLE ENERGY XI: Offshore Wind 11: Power 4 (V. 1)
Wednesday June 20 16:20 Room 3

Chair: JP Liyanage, Univ of Stavanger, Norway

Aerodynamic Inflow Conditions on Floating Offshore Wind Turbine Blades for Airfoil Design Purposes

D Matha, T Lutz, F Wendt, PW Cheng, Univ of Stuttgart, Germany

Voltage Forecasting in a Very Short Time Through the Application of Fuzzy Systems

ED Garcia, CERTAJA ENERGIA; LN Canha, AR Abaide, PRP Silva, RG Milbradt, Federal Univ of Santa Maria, Brazil

Stability Analysis of Four Parallel-Operated DFIG-based Offshore Wind Farms Fed to a Large Power Grid through a VSC-HVDC Link

L Wang, MS Nguyen Thi, National Cheng Kung Univ, Taiwan, China

From the Installation of Submarine Cable to Probe the Prospective Development of Ocean Energy in Taiwan

CK Lin, SR Liaw, CECI Engineering Consultants; HH Lee, National Sun Yat-sen Univ, Taiwan, China

Passive Locomotion of a Self-propelled Three-dimensional Flapping Wing

JX Hu, Q Xiao, Univ of Strathclyde, UK

112. RENEWABLE ENERGY XX: Tidal & Current Energy 2 (V. 1)
Thursday June 21 08:00 Room 1

Chair: BS Hyun, Korea Maritime Univ, Korea

Optimal Heat Transfer Design of an Ocean Turbine Pressure Vessel using Soft Computing

NI Xiros, Univ of New Orleans; K Kaiser, Virginia Tech, USA

Experimental Study on New Type of Vertical Axis Tidal Current Energy Converter

HG Kang, W Guo, B Chen, Y Xie, Dalian Univ of Tech, China

Efficiency Test of Multi-layer Vertical Axis Tidal Current Turbine

YU Ryu, KO Ko, CB Park, Hyundai Engineering & Construction, Korea

Demonstrative Power Generation by Twin-Runner Darrieus Turbine in Kanmon Strait

K Hiraki, R Wakita, T Kanemoto, Kyushu Inst of Tech; M Takao, Matsue College of Tech, Japan

Steady Flow Simulation of a Vertical Axis Marine Current Turbine

SM Camporeale, M Torresi, B Fortunato, G Pascazio, Politecnico di Bari, Italy

Flow Control for VATT by Fixed and Oscillating Flap

Q Xiao, W Liu, Univ of Strathclyde, UK

A Numerical Study of Darrieus Water Turbine

I Paraschivoiu, NV Dy, École Polytechnique de Montréal, Canada

114. RENEWABLE ENERGY XII: Offshore Wind 12: General (V. 1)
Thursday June 21 08:00 Room 3

Chair: SY Hong, Maritime & Ocean Eng Research Inst, Korea

Gain Scheduling for Output H_∞ Control of Offshore Wind Turbine Systems

T Bakka, HR Karimi, Univ of Agder, Norway; N Duffie, Univ of Wisconsin-Madison, USA

Semi-active Mixed H_2/H_∞ Control Design for Offshore Wind Turbine Systems

HR Karimi, Univ of Agder, Norway

Control Systems for Floating Offshore Wind Turbines

TM Duarte, AJNA Sarmento, Tech Univ of Lisbon, Portugal

Logistic Concepts for the Network of Offshore-Wind Energy

T Beinke, A Schweizer, B Scholz-Reiter, BIBA GmbH, Germany

**Approach of a Port Inventory Control System for the Offshore
Installation of Wind Turbines**

M Luetjen, BIBA GmbH, Germany; HR Karimi, Univ of Adger, Norway; B
Scholz-Reiter, BIBA GmbH, Germany

122. RENEWABLE ENERGY XXI: Tidal & Current Energy 3 (V. 1)
Thursday June 21 10:30 Room 1

Chair: JH Ko, Korea Ocean Research & Develop Inst, Korea

**The Influence of Flow Acceleration on Tidal Stream Turbine Wake
Dynamics: A Numerical Study Using the Non-Uniformly Loaded
Actuator Disk Method**

R Malki, I Masters, AJ Williams, TN Croft, Swansea Univ, UK

Study on the Comparison of Three Type Tidal Stream Generators

JH Ko, Korea Ocean Research & Development Inst, Korea

**Performance Prediction and Structural Integrity Assessment of 50kW
Tidal Turbine using Unidirectional FSI Method**

SY Bae, BS Kim, WJ Kim, SL Lee, Korean Register of Shipping, Korea

Performance Prediction of a Cavitating Marine Current Turbine

D Usar, S Bal, Istanbul Tech Univ, Turkey

Foundations and Loadings on In-Stream Tidal Turbine Systems

TA Newson, Univ of Western Ontario, Canada; P Larkin, Senergy; R
Maynard, RM Associates, UK

**Development of HAT Impeller with Low Tip Vortex and High
Efficiency for 1 Mw Class Marine Current Turbine**

MC Kim, IR Do, WJ Lee, Pusan National Univ; BS Hyun, Korea Maritime
Univ; SH Rhee, Seoul National Univ, Korea

124. RENEWABLE ENERGY XIII: Wave Energy 1 (V. 1)
Thursday June 21 10:30 Room 3

Chair: S Nagata, Saga Univ, Japan

**The Learning and Development Process of the Oyster. Wave Energy
Converter**

JE Skelton, K Doherty, G Bryans, Aquamarine Power, UK

**Design and Construction of a Hydraulic Power Take-Off Applied to a
Wave Energy Converter**

P Beirco, C Malga, Inst Superior de Engenharia de Coimbra, Portugal

**Floating Type Ocean Wave Power Station at Various Wave
Circumstances**

S Okamoto, T Kinoshita, T Kanemoto, Kyushu Inst of Tech, Japan

**Concept Study on Converting Wave Energy by a Large Amplitude
Surging Floater**

GJ Chen, LF Xiao, X Li, Shanghai Jiao Tong Univ, China

On the Dynamic Response and Foundation Loads of a Pitching Flap Type Wave Energy Converter

JR Steynor, JP Chick, Univ of Edinburgh; G Bryans, Aquamarine Power; V Venugopal, Univ of Edingurgh; J Van't Hoff, Aquamarine Power, UK

Water Spider Wave Power Device: Conceptual Study

Y Li, LJ Wu, DS He, XQ Zheng, SL Zhou, Chongqing Jiaotong Univ, China

132. RENEWABLE ENERGY XXII: Thermal Energy (V. 1)
Thursday June 21 14:00 Room 1

Chair: Y Ikegami, Saga Univ, Japan

Feasibility Study on Commercial Ocean Thermal Energy Conversion Plant

HJ Kim, HS Lee, YK Jung, DH Jung, DS Moon, SW Hong, Korea Ocean Research & Development Inst, Korea

Research on Double Stage-Rankine Cycle for Ocean Thermal Energy Conversion (OTEC) Using Ammonia as Working Fluid

Y Ikegami, T Morisaki, Saga Univ, Japan

Research on Ocean Thermal Energy Conversion (OTEC) System Using HFC245fa as Working Fluid

T Morisaki, Y Ikegami, Saga Univ, Japan

Energy Generation Based on Combined Salinity and Heat Differences

VV Knyazhev, Inst of Marine Tech Problem, Russia; IK Kaikov, R Zorn, Karlsruhe Inst of Tech, Germany

Optimal Design of a Solar Hot Water Plant with Economic Evaluation

YD Kim, K Thu, King Abdullah Univ of Science & Tech, Saudi Arabia; KC Ng, CS Bhatia, National Univ of Singapore, Singapore

134. RENEWABLE ENERGY XIV: Wave Energy 2 (V. 1)
Thursday June 21 14:00 Room 3

Chair: SW Hong, Maritime & Ocean Eng Research Inst, Korea

Performance of the OWC Pico Plant - Comparison between Real-Scale Data and Wave-to-Wire Model Results

I Le Crom, Wave Energy Centre, Portugal

Numerical Analysis of a Fixed-type Oscillating Water Column with Irregular Waves

WC Koo, Univ of Ulsan, Korea; MH Kim, Texas A&M Univ, USA

Effects of Wave Direction on the Performance of OWC-type Wave Energy Converter

BS Hyun, JY Jin, Korea Maritime Univ, Korea; Z Liu, Ocean Univ of China, China; KY Hong, MOERI/KORDI, Korea

A Prediction Method and Performance of OWC Type WEC with Projecting Walls

T Ikoma, K Masuda, Nihon Univ; H Osawa, T Miyazaki, JAMSTEC; H Omori, Nihon Univ, Japan

A Finite Element Model of the Response of OWCs to Weakly Nonlinear Coastal Waves

J-R Nader, SP Zhu, P Cooper, Univ of Wollongong, Australia

An Alternative Approach to Match the Turbine to the Characteristics of a OWC Plant

F Castro, B Pereiras, M Rodriguez, Univ Valladolid, I Lopez, Univ Santiago Compostela, Spain

142. RENEWABLE ENERGY XXIII: Marine Bioenergy (V. 1)
Thursday June 21 16:20 Room 1

Chair: A Sarmento, IST, UTL, Portugal

The Simulation of the Hydrodynamic Properties of Gravity Cage for Flatfish Culture in Waves

YP Zhao, XF Chen, TJ Xu, GH Dong, CT Guan, Dalian Univ of Tech, China

Capturing Carbon Dioxide by a Self-Sustained Coral Reef Park with Renewable Energy

TC Su, Florida Atlantic Univ, USA; Z Ni, Beijing Univ of Aeronautics & Astronautics, China; PC Quiray, U Raja, Florida Atlantic Univ, USA

Experimental Study of Anaerobic Digestion of Marine Biomass

K Kuroda, Y Akiyama, N Kotera, Y Keno, N Nakatani, K Otsuka, Osaka Prefecture Univ, Japan

An Integrated Assessment for Marine Biomass Utilization System Using Exergy Concept

K Kuroda, N Nakatani, K Otsuka, Osaka Prefecture Univ, Japan

144. RENEWABLE ENERGY XV: Wave Energy 3 (V. 1)
Thursday June 21 16:20 Room 3

Chair: H Kajiwara, Kyushu Univ, Japan

Co-Chair: WC Koo, Univ of Ulsan, Korea

Geometry Optimization of 1.5 km Overtopping Wave Energy Device Implemented into the New Breakwater for Hanstholm Port Expansion in North-West Denmark

L Margheritini, Aalborg Univ, Denmark

A Submerged OWC Breakwater for Wave Energy Conversion and Coastal Protection

SM Camporeale, Politecnico di Bari; PGF Filianoti, Mediterranean Univ of Reggio Calabria, Italy

Development of Wave Overtopping Type Wave Power Generation Devices

H Tanaka, M Yodokawa, N Nikawadori, O Yamanashi, Tokai Univ, Japan

Study on the Wave Response and Efficiency of a Pendulum Wave Energy Converter

JY Park, SH Shin, KY Hong, SH Kim, MOER/KORDI, Korea

Prediction of the Hydrodynamic Performance of the Floating Pendulum Wave Energy Converter in Regular and Irregular Waves

BW Nam, SY Hong, SW Hong, SH Shin, MOERI/KORDI, Korea

The Heave and Pitch Power Output of a Vertical Cylindrical Wave Energy Converter in Finite-Depth Water

MT Hariri Nokob, Masdar Inst of Science and Tech, UAE; D K-P Yue, MIT, USA

Wave Power Absorption of a Vertical Cylinder Heaving about a Pole in Finite Depth Water

MT Hariri Nokob, Masdar Inst of Science & Tech, UAE

2D Numerical Analysis on Floating Type Pendulum Wave Energy Converter in Regular Waves

K Toyota, S Nagata, Y Imai, T Setoguchi, Saga Univ, Japan

ENVIRONMENT (V. 1)

7. ENVIRONMENT I: Oil Spill and Emission (V. 1)
Monday June 18 10:30 Room 6

Chair: C Bostater, Florida Inst of Tech, USA

Operational Oceanography as a Tool for MSFD Implementation

F Lalli, A Truschi, V Pesarino, ISPRA, Italy

2-D Modeling of Oil Slick Transport: A Case Study

SN Erturk Bozkurtoglu, Istanbul Tech Univ, Turkey

Lattice Boltzmann Simulation for the Prediction of Oil Slick Movement and Spreading in Ocean Environment

S Ha, NK Ku, KY Lee, M Friebe, Seoul National Univ, Korea

An Optimized Method to Trace the Oil Spill Based on a Multi-Buoys System

TL Wang, SJ Su, Dalian Maritime Univ, China

Exhaust Characteristics of the Nitrous Oxygen as Navigational Conditions on the Ship

DH Yoo, Y Nitta, M Ikame, National Maritime Research Inst; M Hayashi, H Fujita, Kobe Univ, Japan

Assessment of Ship's Emissions Using Recovery Systems

S Al-Zubaidy, KB Sreedhar, Nazarbayev Univ, Kazakhstan

Waste Management Model for Ship Life Cycle Assessment (LCA)

UB Celebi, N Vardar, T Akanlar, V Alankaya, Yildiz Tech Univ, Turkey

17. ENVIRONMENT II: Physical & Chemical Processes (V. 1)
Monday June 18 14:00 Room 6

Chair: F Lalli, ISPRA, Italy
Co-Chair: G Schriever, Biolab Forschungsinstitut, Germany

Tidal Simulation in Loch Linnhe Using a Finite Volume Shallow Flow Model

YA Albouraee, QH Liang, MI Downie, Newcastle Univ, UK

Surface and Subsurface Imaging of Released Oil in Littoral Zones

CR Bostater, F Leavaux, G Coppin, H Frystacky, J Jones, Florida Inst of Tech, USA

Behaviour of Disposed Brine in Stratified Marine Environment

B Bas, SN Erturk Bozkurtoglu, SM Kabdasli, Istanbul Tech Univ, Turkey

Numerical Study on Pollutant Transport in Long-Narrow Waters - Xiangshan Bay, China

J Xie, ZC Sun, SX Liang, SS Tu, Dalian Univ of Tech, China

pH and Ionic Strength Effects on the Binding Constant between N-PAC and Humic Acid

CL Lee, KC Chang, PC Hsieh, SM Kao, National Sun Yat-sen Univ, Taiwan, China

Naturally Grown Ag Nanoparticle SERS Substrate as Chemical Sensor in Water Body Applying a 488 nm Microsystem Diode Laser

YH Kwon, TU-berlin; R Ossig, Univ Kassel; A Kolomijeca, TU-Berlin; F Hubenthal, Univ Kassel; HD Kronfeldt, TU-Berlin, Germany

27. ENVIRONMENT III: Water & Sediment Qualities(V. 1)
Monday June 18 16:20 Room 6

Chair: K Otsuka, Osaka Prefecture Univ, Japan

Water and TP Budgets Analysis Including Submarine Groundwater near the Intertidal Zone

M Hayashi, Kobe Univ; M Taniguchi, RIHN; T Fujii, Nara Univ of Education; S Onodera, Hiroshima Univ; Y Umezawa, Nagasaki Univ, Japan

Experimental Investigation of the Effect of Flow Turbulence on the Kinetics of Phosphorus Desorption from Suspended Sediment

B Xia, QH Zhang, Tianjin Univ; B Deng, CB Jiang, Changsha Univ of Science & Tech, China

Purification Experiments of Ocean Sludge by Activating Microorganisms

K Okamoto, T Toyama, H Kohno, K Hotta, Nihon Univ, Japan

Fractionation of Oxygen Consumption Component in the Inner Western Area of Ariake Bay, Japan

T Tokunaga, K Kimoto, Seikai National Fisheries Research Inst, Japan

Numerical Diagnostic Study on Dominant HAB Species Succession Mechanism during HAB in the Highly Frequent HAB Occurrence Area in the East China Sea

Q Wang, LS Zhu, South China Univ of Tech, China

**Enhancement Modeling of Light Intensity and Phytoplankton
Dynamics in Tokyo Bay Using Extensive Monitoring Dataset**

M Jedari Attari, J Sasaki, Yokohama National Univ, Japan

**An Experimental Study on the Effects of *Posidonia Oceanica* Seagrass
Patches on the Velocity Patterns under Wave Conditions**

N Elginöz, E Oguz, AM Akgul, SM Kabdasi, Istanbul Tech Univ, Turkey

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