

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	Individual session rooms
On-site Registration	Lobby
ISOPE Headquarters	VIP Lounge
Proceedings Pickup	Registration Desk, Lobby
Committee Meetings	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
103. HYDRODYNAMICS XIII: DP & Control	Room 2
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

TSUNAMI AND SAFETY SYMPOSIUM (V. 3)

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

COASTAL HYDRODYNAMICS (V. 3)

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
76. HPM II: Adv Materials & Structures 2	Room 5
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
146. HPM IX: Advances in Welding Technology 2	Room 5

ASSET INTEGRITY (V. 4)

6. ASSET INTEGRITY I	Room 5
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
20. RISK & RELIABILITY II	Room 9
30. RISK & FATIGUE	Room 9

ADVANCED SHIP TECHNOLOGY (V. 4)

46. ADVANCED SHIP TECH I: Ultimate Strength	Room 5
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
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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

1. Opening General Session: OCEAN AND ENERGY INDUSTRY REVIEW (V. 1)

Monday June 18 08:30 Jupiter

Chair: Jin S. Chung, ISOPE, USA
Co-Chair: I Langen, Univ of Stavanger, Norway

Conference Opening Address
Raghavan Ayer, ISOPE President, ExxonMobil Research & Engineering, USA

From the Longest to the Deepest Sealines
Roberto Bruschi, Director, SAIPEM Energy Services, Fano, Italy

2 MW Floating Offshore Wind WinFloat Prototype and Futue Plan
[Oral presentation]
Antonio Vidigal, CEO, EDP Inovation, Portugal

SLOSHING DYNAMICS AND DESIGN (V. 3)

Monday **2. LNG SLOSHING I: GTT Progress (V. 3)** Room 1
 June 18 10:30

Chair: M Kaminski, Delft Univ of Tech, Netherlands
Co-Chair: YH Kim, Seoul National Univ, Korea

Welcome Address
Frederic Dias and Jin Chung

Elementary Loading Processes (ELP) Involved in Breaking Wave Impacts: Findings from the Sloskel Project

W Lafeber, MARIN, Netherlands; L Brosset, Gaztransport & Technigaz, France; H Bogaert, MARIN, Netherlands

A Mark III Panel Subjected to Three Different Types of Wave Impacts: Results from the Sloskel Project

L Brosset, Gaztransport & Technigaz, France; H Bogaert, MARIN, Netherlands

Model Scale Test vs. Full Scale Measurement: Findings from the Full Scale Measurement of Sloshing Project

CF Berthon, R Pasquier, Gaztransport & Technigaz, France

Comparison of Wave Impact Tests at Large and Full Scale: Results from the Sloskel Project

W Lafeber, MARIN, Netherlands; L Brosset, Gaztransport & Technigaz, France; H Bogaert, MARIN, Netherlands

Loads on Mark III Corrugated Primary Membrane: Findings from the Sloskel Project

M Marhem, GTT, France; W Lafeber, H Bogaert, MARIN, Netherlands; L Brosset, GTT, France

Reconciliation of a Mark III Finite Element Model with Static Tests and Sloskel Wave Impact Tests

N Elkhodja, V Perrin, M Marhem, M Malochet, J Cardot, L Brosset, Gaztransport & Technigaz, France

12. LNG SLOSHING II: Physics & Coupling (V. 3) Room 1
Monday June 18 14:00

Chair: L Diebold, Bureau Veritas, France

Co-Chair: F Dias, Univ College Dublin, Ireland

Influence of Phase Transition on Sloshing Impact Pressures Described by a Generalized Bagnold's Model

M Ancellin, ENS-Cachan; L Brosset, Gaztransport & Technigaz; J-M Ghidaglia, ENS-Cachan, France

Study on the Effect of Density Ratio of Liquid and Gas in Sloshing Experiment

YH Kim, YJ Ahn, SY Kim, KH Kim, SW Lee, Seoul National Univ; JJ Park, Samsung Heavy Industries, Korea

Influence of a Bubbles Curtain on the Impact of Waves on a Vertical Wall

O Kimmoun, Ecole Centrale Marseille, A Ratouis, L Brosset, GTT, France

Experimental and Numerical Study of Liquid Sloshing in a Rectangular Tank with Three Fluids

B Molin, F Remy, Ecole Centrale Marseille; C Audiffren, R Marcer, Principia; A Ledoux, Total E&P, France; S Helland, Total E&P Norge, Norway; M Mottaghi, Total E&P, France

Sloshing and Two-Body Motion Analysis of FLNG Considering Coupled Effects

JJ Park, JH Seo, MS Kim, BW Kim, JK Eom, Samsung Heavy Industries, Korea

Linear and Nonlinear Coupling Effects of Ship Motion and Sloshing in Time-Domain Numerical Simulation

WY Duan, S Huang, Harbin Engineering Univ, China

The Method Used for Predict Ship Motions Coupled with Liquid Sloshing

RQ Zhu, Jiangsu Univ of Science & Tech; K Zou, QM Miao, China Ship Scientific Research Center, China

22. LNG SLOSHING III: LNG Tank Design 1 (V. 3)

Monday June 18 16:20 Room 1

Chair: L Brossset, Gaztransport & Technigaz, France

Co-Chair: J-M Ghidaglia, ENS-Cachan, France

Laboratory Study on Effects of Baffle on Reducing Liquid Sloshing in a Tank

MA Xue, Hohai Univ; PZ Lin, Sichuan Univ; JH Zheng, Hohai Univ, China

Influence of Raised Invar Edges on Sloshing Impact Pressures during Drop Tests - Numerical Investigations

L Diebold, N Moirod, Bureau Veritas, France

Design Improvement of LNG Pump Tower Structure

MS Lee, DH Kim, WS Kim, Hyundai Heavy Industries, Korea

Nonlinear Liquid Sloshing in a 3D Square Tank with Internal Structures

CH Wu, BF Chen, National Sun Yat-sen Univ, Taiwan, China

Comparative Study on Effect of Cross Tie on Sloshing Loads of a VLCC

SS Jeon, JH Jung, MJ Song, MC Ryu, YS Kim, Daewoo Shipbldg & Marine Engineering, Korea; SE Kim, American Bureau of Shipping, USA

Experimental Study on the Effects of Sloshing Loads on Fatigue Strength of an Independent Type-B LNG Tank

MJ Song, Daewoo Shipbldg & Marine Engineering; YJ Ahn, SY Kim, Seoul National Univ; JH Jung, Daewoo Shipbldg & Marine Engineering; YH Kim, Seoul National Univ, Korea

Structural Safety Assessment for Independent LNG Cargo Tank Considering the Support Structure

JK Bang, STX Offshore & Shipbldg, Korea

32. LNG SLOSHING IV: LNG Tank Design 2 (V. 3)
Tuesday June 19 08:00 Room 1

Chair: YH Kim, Seoul National Univ, Korea

Simulation of the Sloshing in the Prismatic Gas Tank after Impact Interaction of the Vessel with Ice Barrier

NV Tryaskin, IV Tkachenko, AO Dukarskiy, State Marine Tech Univ-St. Petersburg; DB Kiselev, Severnoye Design Bureau; VV Yakimov, VN Tryaskin, State Marine Tech Univ-St. Petersburg, Russia

Effects of Earthquake on LNG Storage Tank under Different Liquid Height

KW Lee, JH Kim, Korea Gas, Korea

Experimental and Numerical Investigations of Internal Global Forces for Violent 6 Degrees of Freedom Irregular Excitations in LNGC Prismatic Tanks

L Diebold, N Moirod, E Baudin, T Gazzola, Bureau Veritas, France

A Computer Code for Fast Simulations of Liquid Tank Sloshing

YS Cao, FW Zhang, MARINTEK USA; S Liapis, Shell, USA

A Study on the Sloshing Effect on the Roll Motion of a 2D Rectangular Tank in Regular Waves

HS Choi, YH Kim, Seoul National Univ; DY Lee, Daewoo Shipbldg & Marine Engineering, Korea

Apply MPS Method to Simulate Liquid Sloshing in LNG Tank

YX Zhang, DC Wan, Shanghai Jiao Tong Univ, China

Numerical Simulation of Sloshing in a Rectangular Tank Subjected to Rotational Motion

JJ Stephen, SA Sannasi, V Sundar, IIT Madras, India

42. LNG SLOSHING V: Sloshing Tests (V. 3)
Tuesday June 19 10:30 Room 1

Chair: F Dias, Univ College Dublin, Ireland

First Sloshing Model Tests Benchmark

T Loysel, Alten; S Chollet, E Gervaise, L Brosset, P-E de Seze, Gaztransport & Technigaz, France

Sloshing Model Tests at Scale 1:10

L Brosset, C Kosinki, J Amaichan, S Claude, Gaztransport & Technigaz, France

Comparison of Two Measuring Systems with Various Acquisition Frequencies for Sloshing Tests

B Fillon, J Henry, Bureau Veritas, France

An Alternate Maximum Impact Pressure Measurement

E Baudin, B Fillon, L Diebold, Bureau Veritas, France

Repeatability and Practical Ergodicity of 2D Sloshing Experiments

E Botia Vera, J Mas Soler, Tech Univ of Madrid, Spain; G Bulian, Univ of Trieste, Italy; A Souto Iglesias, Tech Univ of Madrid, Spain

Experimental Investigation of 3D Sloshing Effects in Thin Rectangular Tanks

S Schreier, B Mehl, Univ of Rostock, Germany

An Experimental Investigation of Liquid Sloshing Impact Load on a Rectangular Tank

ZJ Wei, QJ Yue, SL Ruan, SQ Tong, TW Hu, Dalian Univ of Tech, China

Tuesday **52. LNG SLOSHING VI: CFD (V. 3)** **Room 1**
June 19 **14:00**

Chair: M Kashiwagi, Osaka Univ, Japan

Co-Chair: J-M Ghidaglia, ENS-Cachan, France

Simulation of Breaking Wave Impacts on a Mark III Containment System for LNG Carriers with LS-DYNA Bi-fluids

N Couty, HydrOcean; L Brosset, Gaztransport & Technigaz, France

Simulations of Breaking Wave Impacts on a Mark III Containment System for LNG Carriers with a Two-Phase Fluid-Structure SPH Model

P-M Guilcher, HydrOcean; L Brosset, GTT; E Jacquin, HydrOcean; D Le Touzé, Ecole Centrale Nantes, France

Simulation of Breaking Wave Impacts on a Rigid Wall by a 2D Compressible Two-Fluid Finite Volume Solver with Advanced Free Surface Reconstruction

J-P Braeunig, CEA/DAM/DIF; L Brosset, Gaztransport & Technigaz; J Costes, ENS-Cachan/EUROBIOS; F Dias, ENS-Cachan, France/Univ College Dublin, Ireland; J-M Ghidaglia, ENS-Cachan, France

Numerical Study of Violent Sloshing in a FPSO Tank

YM Zhang, American Bureau of Shipping, USA; QW Ma, J Zhou, City Univ, UK

Numerical Modeling of Sloshing in Rigid Tanks Using the Mesh-Free Radial Basis Function Collocation Method

KR Cakiroglu, O Borekci, SA Kilic, Bogazici Univ, Turkey

Study of Free Surface Flows Using Level Set Method

N Repalle, Univ of Western Australia, Australia; KP Thiagarajan, IIT Madras, India; M Kantharaj, Univ of Maine, USA

CFD Post-Processing for Sloshing and Comparison with Potential Theory

L Diebold, N Moirod, T Gazzola, Bureau Veritas, France

62. LNG SLOSHING VII: Structural Responses (V. 3)
Tuesday June 19 16:20 Room 1

Chair: YH Kim, Seoul National Univ, Korea
Co-Chair: L Diebold, Bureau Veritas, France

**Structural Safety Assessment of LNGC MARK III Membrane Type
CCS under Sloshing Impact Loading**
SG Lee, JK Kim, Korea Maritime Univ, Korea

**Parametric Investigation on the Simplified Triangular Impulse of
Sloshing Pressure and Categorization of the Structural Response on the
Mark III LNG CCS**
SC Kim, Inha Technical College; IS Nho, Chungnam National Univ; BS
Jang, Seoul National Univ; JH Lee, Inha Univ, Korea

**Reliability-Based Sloshing Assessment of Containment Systems in
LNGCs and FLNGs**
B Wang, U Shin, C Wang, American Bureau of Shipping, USA

**Finite Particle based Elastic Structure Dynamics Modeling for LNG
Sloshing Analysis**
A Baeten, Augsburg Univ of Applied Sciences, Germany

**Simplified Impinging Jet Model for Practical Sloshing Assessment of
LNG Cargo Containment**
SY Hwang, JH Lee, Inha Univ; SC Kim, Inha Technical College; DK Jo,
Inha Univ, Korea

**Dynamic Amplification Factor of NO96 Insulation Structures of Membrane
System**
H Dobashi, A Usami, ClassNK, Japan

**Simulations of a Sloshing Experiment by FEM CFD, SPH and FEM FSI
Approaches**
M Viviani, M Fossa, CM Rizzo, G Tani, Univ of Genoa, Italy

111. LNG SLOSHING VIII: Panel (V. 3)
Wednesday June 20 16:20 Room 10

Panelists
to be announced

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