

The Proceedings of The Seventh (1997) International OFFSHORE AND POLAR ENGINEERING CONFERENCE

Honolulu, Hawaii, USA, May 25-30, 1997

VOLUMES I, II, III, IV, 1997

Copyright © 1997 by International Society of Offshore and Polar Engineers,
Golden, Colorado, USA. All Rights Reserved.

www.isopec.org; meetings@isopec.org

For set of 4 volumes; 3,556 pp.

International Standard Book Number: ISBN 1-880653-28-1 (Set)

Library of Congress Catalog Card Number: 97-70292

Indexed by Engineering Index, Compendex and Others

www.isopec.org: orders@isopec.org

International Society of Offshore and Polar Engineers (ISOPE)
P.O. Box 189, Cupertino, California 95015-0189 USA



International Society of
Offshore and Polar Engineers

The Proceedings of The Seventh (1997) International OFFSHORE AND POLAR ENGINEERING CONFERENCE

Honolulu, Hawaii, USA, May 25-30, 1997

VOLUME I, 1997

Offshore Resource & Technology, Sakhalin Oil & Gas, Resources & Energy (Wave Energy, Gas Hydrates and Deep-Ocean Mining), TLP, Very Large Floating Structures (VLFS) and FPSO, Offshore Systems, Environment (Deep-Sea Impact, Waste and Transport, Pollutant, Contamination, Ecology), Geotechnical Engineering

How to Use This Table of Contents

Scroll down or use the bookmarks in the left-side frame to move to a new location in this index. Click on a **blue paper title** you like to view.

To return to this index after viewing a paper, click on PREVIOUS MENU bookmark in the left-side frame.

This CD-ROM is created from the PDF files. The hard-copy originals in the proceedings are scanned and saved as PDF files. View quality of the text and graphics, the searchability and the ease of readability depend largely on the quality and/or consistency of the originals.

Copyright © 1997 by International Society of Offshore and Polar Engineers,
Golden, Colorado, USA. All Rights Reserved.

www.isopec.org: orders@isopec.org

International Standard Book Number: ISBN 1-880653-28-1 (Set)

Library of Congress Catalog Card Number: 97-70292

Indexed by Engineering Index, Compendex and Others

www.isopec.org: orders@isopec.org

edited by:

Jin S. Chung, Colorado School of Mines, Golden, Colorado, USA

Braja M. Das, California State University, Sacramento, California, USA

Tamotsu Matsui, Osaka University, Osaka, Japan

H. Thiel, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

presented at:

The Seventh (1997) International Offshore and Polar Engineering Conference held in Honolulu, USA, May 25-30, 1997

organized by:

International Society of Offshore and Polar Engineers

sponsored by:

International Society of Offshore and Polar Engineers (ISOPE)
with cooperating societies and associations

The publisher and the editors of its publications assume no responsibility for the statements or opinions expressed in papers or presentations by the contributors to this conference or proceedings.

**International Society of Offshore and Polar Engineers (ISOPE)
P.O. Box 189, Cupertino, California 95015-0189 USA**

CONTENTS

PLENARY PRESENTATIONS

Environmental Protection of the Deep Sea: A Challenge for Engineers, Scientists and Politicians <i>Hjalmar Thiel</i>	1
The Tokyo Bay Tunnel of the Trans-Tokyo Bay Highway <i>T. Funasaki, Y. Izumi, T. Masuda and M. Kanai</i>	6
Lessons to Learn from Full Scale Measurements of Snorre TLP Tethers <i>Arnljot Skogvang and Horst Vogel</i>	16
OCEAN AND TECHNOLOGY REVIEW	
Norway's Remaining Petroleum Resources: Perspectives and Challenges <i>Finn Roar Aamodt</i>	25
Emergency Management for Coastal Earthquake Disaster from the Viewpoint of the Sea <i>Ichiro Tanaka</i>	29
SAKHALIN OIL AND GAS	
Neftegorsk Earthquake, 28 May 1995, Sakhalin Island <i>V.V. Kharakhinov, S.G. Litvinov and S.P. Beketsky</i>	35

Aspects of the Environmental Safety in the Processes of the Development of Oil/Gas Fields Offshore Sakhalin	
<i>T.V. Gnezdova and A.N. Kravchenko</i>	38
The Role of Oil and Gas Projects of Sakhalin Shelf in Supplement of Far-Eastern Region of Russia with Fuel-Energy Resources	
<i>L.S. Brodski, I.Ph. Vasyanovich and E.K. Terpugov</i>	42
Oil and Gas Exploration on the North Sakhalin and Its Shelf	
<i>V.M. Zakalsky, V.S. Kovalchuk, A.V. Kuchin and Yu. S. Mavrinsky</i>	46
Petroleum Possibilities of the Far Eastern Seas	
<i>E.G. Koblov, Yu.S. Mavrinsky and V.V. Kharakhinov</i>	50
Production and Domestic Distribution of Sakhalin Offshore Natural Gas	
<i>S.M. Bogdanchikov and V.N. Astafiev</i>	62
Parameters of Ice Ridges of the Okhotsk Sea	
<i>G.A. Surkov</i>	68
RESOURCES AND ENERGY	
Utilisation of CFD to Study an Oscillating Water Column	
<i>P. White, M. Webster, A. Thakker and M. O'Dowd</i>	70
Air Turbine with Cambered Blades for Wave Energy Conversion: Performances in Steady Flow Condition	
<i>Kenji Kaneko, Manabu Takao and Toshiaki Setoguchi</i>	77
Effect of Guide Vanes on the Performance of a Wells Turbine for Wave Energy Conversion	
<i>T. Setoguchi, M. Takao, K. Kaneko and M. Inoue</i>	83
Some Considerations to Ocean Wave Power Converter	
<i>Tomiji Watabe</i>	89
Gas Hydrates in the Messoyakha Gas Field of the West Siberian Basin - A Re-Examination of the Geologic Evidence	
<i>Timothy S. Collett and Gabriel D. Ginsburg</i>	96
Estimated Gas Hydrate Volumes: Example from the Niger Delta Front	
<i>Martin Hovland, Ben Clennell, Joseph W. Gallagher and Knut Lekvam</i>	104
A Study and Hypothesis of Hydrate Growth Using a Low Dosage Hydrate Inhibitor (During a Shut-In Period in a Multiphase Pipeline)	
<i>Are Lund, Olav Urdahl, Olav Lier, Lars Henrik Gjertsen, Thorvald Jakobsen and John Andreas Støvneng</i>	110
Sea Bottom Radioactivity Measurement Systems in Japan	
<i>Mutsuo Hattori, Yoshii Kobayashi and Masaharu Okano</i>	116

A New Broad Band Frequency Modulated Subbottom Profiler Developed for Hawaii <i>James Barry, Steven G. Schock and Marc Ericksen</i>	120
Longitudinal Vibration-Control of Pipe String for Mining Manganese Nodules in Deep Sea with an Elastic Support <i>Yoshikazu Kobayashi and Kazuo Aso</i>	128
To the Problem of Application of Ecologically Good Methods of Building and Titanium-Magnetite Sands Mining in the Shelf <i>Y.N. Niskovskiy, E.V. Niskovskaya and A.M. Vasianovitch</i>	136
The Project of Marine Dressing Complex for Mining the Deposits of the Far Eastern and North-Eastern Seas Shelf <i>Anatoliy V. Zhukov, Vladimir T. Lutsenko and Mikhail I. Zvonarev</i>	138
Mathematical Simulation of Run Operations with Cable-Container System for Deep Ocean Mining of Hard Minerals <i>Ivan F. Glumov, Vadim S. Tikhonov, Alexander I. Safronov, Yuri P. Semyonov and Valery E. Lyubinsky</i>	143
TLP, VLFS AND FPSO	
Long-Term Response of Tension Leg Platforms <i>J.J.M. Baar, C.T. Howell, R.S. Mercier and G. Rodenbusch</i>	150
An Analysis Procedure for the Tendons of a Tension Leg Platform <i>Luiz Henrique Moraes Alves and Breno Pinheiro Jacob and Gilberto Bruno Ellwanger</i>	161
UOE-Formed Tendon Pipes for Deep Water Oil & Gas Exploration in the Gulf of Mexico <i>Tomoaki Ikeda, Kazushi Ohnishi, Akio Yamamoto, Makoto Nagase, Izumi Takeuchi and James D. Smith</i>	169
Response Prediction of a TLP in Cyclonic Storm Conditions <i>S.A. Higgins, J.B. Hinwood and K.P. Thiagarajan</i>	177
An Investigation of Extreme Wave Behaviour Around a Model TLP <i>A.D. Arnott, C.A. Greated, A. Incecik and A. McLeary</i>	185
Time Domain Simulation of a TLP's Response Due to Laboratory-Generated Asymmetric Irregular Waves <i>J. Zou, Y. Xu and C.H. Kim</i>	193
Dragged Surge Motion on Tension Leg Platform Tethers <i>Hsien Hua Lee, Pei-Wen Wang and Chung-Pan Lee</i>	201
Interaction of Waves and a Porous Tension Leg Platform with an Impermeable Top Layer <i>Chung-Pan Lee and Wen-Kuei Ker</i>	207
First- and Second-Order Wave Forces on a Large Spar Platform <i>Hyungsuk Yoo, David C. Weggel, Edward J. Powers and Jose M. Roesset</i>	215

Numerical Study of the Hydrodynamic Forces on Huge Floating Structures in Waves and Ocean Currents <i>Yoshiyuki Inoue, Xuangang Zhang and Shigeru Tabeta</i>	221
A B-Spline Galerkin Scheme for Computing Wave Forces on a Floating Very Large Elastic Plate <i>Masashi Kashiwagi</i>	229
Three-Dimensional Slamming of a Distorted Plate <i>Ken Takagi</i>	237
Dynamic Wave Interaction Analysis of Floating Elastic Plates <i>Tadaaki Tanabe, M. Nishimura and Tetsuo Kawamura</i>	245
Shallow Water Effect on Hydrodynamic Coefficients of Very Large Floating Structures <i>Shin-ichi Aoki</i>	253
Effects of Seaquake on Offshore Floating Structure <i>Kouji Mochizuki, Hajime Kihara, Ken Takagi and Shigeru Naito</i>	261
Dynamic Response of a Very Large Floating Structure with Active Pneumatic Control <i>T. Hirayama and N. Ma</i>	269
Wave-Induced Motions of a Very Large Floating Structure in Quartering Seas <i>Mikio Takaki and Xiechong Gu</i>	277
Hybrid Dynamic Analysis of Large Tension Leg Floating Structures Using Plate Elements <i>Takuji Hamamoto, Akinori Suzuki and Ken-ichi Fujita</i>	285
The Wave Forcing of a Three Dimensional Floating Elastic Body <i>Michael H. Meylan</i>	293
Experimental Study for the Behavior of a Huge Floating Structure <i>H.S. Shin and D.J. Yum</i>	299
Study on the Inverse Analysis Method for Cathodic Protection Problems <i>M. Iwata, Q. Wu, Y. Huang and H. Yajima</i>	307
Structural Requirements for the Conversion of an Oil Tanker to a FPSO as a Permanent System <i>Marina Barbosa Fachetti, Deborah Martinez de Mattos and Carlos Alberto Bardanachvili</i>	312
Process Decks for FPSOs - Effects of Ship Motions and Deformation on Structural Analysis <i>Marcos José de Souza, Breno Pinheiro Jacob and Gilberto Bruno Ellwanger</i>	318
An Efficient System for Floating Production, Storage and Loading in Ice-Covered Sea <i>A. Bech, C.M. Bech, K. Syvertsen and T. Vinje</i>	322
Dynamic Analysis of a FPSO System <i>A.C. Fernandes and S. Sphaier</i>	330
Effects of Mooring Line Dynamics on Position Keeping of a Floating Production System <i>Sup Hong and Sa Y. Hong</i>	336

Disconnectable Concrete FPSO for Arctic Conditions <i>Loic des Déserts, Nicolas Parsloe and François Thiébaud</i>	342
Quasi-Linear Model of a Tanker in a Turret Configuration <i>C.A. Martins, M.R. Martins, A.J.P. Leite and J.A.P. Aranha</i>	349
Offshore Single Point Mooring Systems for Import of Hazardous Liquid Cargoes Offshore Southern California <i>Aaron M. Salancy and Robert G. Bea</i>	355
Dynamics of Moored Tankers - SPM and Turret <i>K. Nishimoto, H.L. Brinati and C.H. Fucatu</i>	370
OFFSHORE SYSTEMS AND OPERATIONS	
Barge Mounting Technique for Installation of Large Offshore Bridge Structure <i>Y.T. Kim and Chul H. Jo</i>	379
Harald Valve Station - a Danish Subsea Installation in the North Sea <i>Nils Gjersøe Fog and Poul Henrik Jønsson</i>	387
Study of Oilfield Produced-Water Pre-Separation Hydrocyclone <i>Jie He, Fuzhou Dong, Zengrui Li and Minghu Jiang</i>	394
Fuzzy Syllogistic Inspection Planning Paradigm for Offshore Structures <i>Hari B. Kanegaonkar</i>	397
Random Fatigue Analysis of a Jacket Type Offshore Structure: Time and Frequency-Domain Approaches <i>Marcos Queija de Siqueira, Ana Lucia Fernandes Lima Torres, Carlos Alberto Bardanachvili, Luis Volnei Sudati Sagrilo, Marina Barbosa Fachetti and Edison C.P. de Lima</i>	404
Study of the Multi-Function Removable Concrete Platform <i>Yu-pu Song and Yi Wei</i>	412
Structural Control of Offshore Platforms <i>J. Suhardjo and A. Kareem</i>	416
Lifting Eye Design <i>Edwin P. Russo, John N. Crisp, William W. St. Cyr and Engin A. Egeseli</i>	425
ENVIRONMENT	
The Environmental Consequences of Large-Scale Research in the Deep Ocean <i>Hjalmar Thiel and Anthony L. Rice</i>	434
Results of the Large Scale Deep-Sea Environmental Impact Study DISCOL During Eight Years of Investigation <i>Gerd Schriever, Ahmed Ahnert, Hartmut Bluhm, Christian Borowski and H. Thiel</i>	438

Experiments on the Influence of Technical Activities in the Deep-Sea on Heavy Metal Cycles <i>Andrea Koschinsky, Hans Gerber and Axel Szemeitat</i>	445
Data Support for Modelling of Deep-Sea Mining Impacts <i>J.A. Jankowski and W. Zielke</i>	451
Large Scale Transport of Particle Reactive Tracers - Numerical Simulations <i>J. Segschneider and J. Sündermann</i>	461
Use of Marine Mineral Tailings for Aggregate and Agricultural Applications <i>John C. Wiltshire</i>	468
The Abundance and Vertical Distribution of Abyssal Benthic Fauna in the Japan Deep-Sea Impact Experiment <i>Tomomi (Sato) Kaneko, Yoriko Maejima and Hirohiko Teishima</i>	475
The Benthic Impact Experiment: A Study of the Ecological Impacts of Deep Seabed Mining on Abyssal Benthic Communities <i>Dwight D. Trueblood and Erdogan Ozturgut</i>	481
Benthic Environmental Baseline Investigations in the Manganese Nodule Area of the Central Indian Basin <i>Rahul Sharma, B. Nagender Nath, S.M. Gupta and Z.A. Ansari</i>	488
Chinese Environmental Investigation Related to Potential Impact of Deep-Sea Mining <i>Huai-Yang Zhou</i>	496
Direct Ocean Storage of CO₂: Options and Obstacles <i>Peter M. Haugan</i>	499
Simulation of Deep Ocean Relocation of Dredged Material <i>Philip J. Valent, David K. Young and Andrew W. Palowitch</i>	505
Numerical Modeling of the Settling Processes of Dredged Material Disposed in Open Waters <i>Qin Jiang, Hiroshi Kunisu and Akira Watanabe</i>	510
Modeling of Offshore Discharge of Drilling Mud <i>Bao-Shi Shiau</i>	516
Establishing a Simulation Strategy for the Dispersion of Drill-Cuttings <i>L. Carles and I. Bryden</i>	521
Infiltration Control Cover Technology Demonstration at Marine Corps Base Hawaii – Preliminary Results of Water Balance Monitoring <i>Leslie Karr, T.E. Hakonson and Bryan Harre</i>	526
Curtains on Board for Preventing Spilt Oil Diffusion <i>Masayoshi Kubo, Kenji Asaki, Kazusei Yamamoto and Tsuyoshi Oki</i>	532
In Situ Anaerobic Bioremediation of Fuel Contaminated Ground Water at Seal Beach, CA <i>Martin Reinhard, Gary D. Hopkins, Eva Orwin and Carmen A. Lebron</i>	539

Laser Heterodyne Imaging for Shallow Water Surveillance <i>M.L. Riazat, R.X. Cao, L.C. Wong and R. Bourke</i>	544
An Impressive Reduction in False Diffusion for Multidimensional Phenomena <i>Takaaki Shigematsu, Kazuki Oda and Masahide Takeda</i>	550
Decomposition of PCB in Soils/Sediments Using the Base-Catalyzed Decomposition Process (BCDP) <i>D.B. Chan</i>	554
Red Hill Fuel Tank Leak Detection <i>William Major, Leslie Karr, George Warren and John Norbutas</i>	561
Surface Flow and Gas Dispersion from a Subsea Release of Natural Gas <i>T. Engebretsen, T. Northug, K. Sjøen and T.K. Fanneløp</i>	566
Specialized Information System on Environment of Yamal Peninsula and Baydaratskaya Bay <i>G.E. Odisharia, A.S. Tsvetsinsky, N.N. Mikhailov and G.I. Dubikov</i>	574
Environmental Impact Assessment for the Baydaratskaya Bay Crossing of the Yamal – West Europe Gas Pipeline System <i>Alexander V. Beloshapkov, Vladimir B. Leschinsky, Alexander S. Tsvetsinsky and Konstantin A. Kashunin</i>	582
Numerical Simulation of Flow and Density Field of Kagoshima Bay in the Summer <i>Yusaku Kyojuka, Changhong Hu and Nobuyuki Iwakiri</i>	587
On Validation of Multi-Level Method for Simulation of Flow Around a Mega-Float: Comparison of Numerical Calculation with Model Experiment <i>Hideyuki Omori, Yusaku Kyojuka, Changhong Hu, Hiroyuki Nakagawa and Masanori Kobayashi</i>	595
Response to Nutrient Addition in Tropical Nearshore Waters, Bays and Estuaries <i>Hans J. Krock</i>	603
Compliance Methodology for Lognormal Populations <i>Ross S. Tanimoto and Hans J. Krock</i>	608
GEOTECHNICAL ENGINEERING	
Static and Dynamic Properties of Marine Soils <i>Shamsher Prakash and Vijay K. Puri</i>	610
Consolidation Analysis of Sensitive Clay by Elasto-Viscoplastic Two-Fractions Mixture Model <i>Nobuharu Abe</i>	617
Bounding Surface Plasticity Theory Applied to Cyclic Loading on Cohesionless Soil <i>Robert Yun-Pin Chin</i>	622
The Analysis of Soft Clay Ground Behavior Using Spline Method <i>Song Lee, Koou-Ho Hwang and Soo-Sam Kim</i>	628

Major Effect of Grain Size Distribution to Coefficient of Permeability of Marine Clay <i>Mitsuharu Fukuda, Seiji Suwa and Takao Uno</i>	634
A Numerical Analysis on the Deformation of Decomposed Granite Soil Foundation Using Elasto-Plastic Model <i>Bang-woong Shin, Kwang-dong Lee, Se-wook Oh and Tae-wook Cheong</i>	639
Comparison of Bathymetry and Consolidation Settlement of Dredge Mound in Long Island Sound <i>H.G. Brandes and A.J. Silva</i>	647
A Case Study on the High Pressure Injection Method for the Quaywall Construction <i>B.S. Chun, Y.S. Chae, H.K. Yoo, D.K. Chung, Y.S. Kim, Y.W. Nam and S.J. Oh</i>	654
Liquefaction Potential in Coastal Areas of Proposed Kaohsiung Deep-Sea Harbor, Taiwan <i>Shen-Chi Chen, Gwan-Shong Wang and Yun-Pin Chin</i>	659
Three Dimensional Liquefaction Analysis of Reclaimed Island <i>F. Oka, A. Yashima, M. Sugito and Y. Taguchi</i>	665
Evaluation of Liquefaction Resistance of Sand by Its Maximum Shear Modulus <i>Yao-Chung Chen</i>	671
Liquefaction Behavior of Sandy Soil Sandwiched by Clay Layers <i>Tej B.S. Pradhan</i>	676
Behavior of Gravity Type Quay Wall During Earthquake Observed in Model Shaking Table Test <i>K. Miura, E. Kohama, S. Kurita, N. Ohtsuka and N. Yoshida</i>	683
Seabed Response to Wave Loading <i>Q.S. Yang and H.B. Poorooshab</i>	689
Liquefaction Strengths of Crushable Soils <i>Masayuki Hyodo, Adrian F.L. Hyde and Noritaka Aramaki</i>	696
Developments in Prefabricated Vertical Drain Enhanced Soil Flushing <i>J.D. Quaranta, M.A. Gabr, E.E. Cook and D. Szabo</i>	703
Evaluation of Ground Densification by Dynamic Compaction Using SASW Method <i>Dong-Soo Kim, Hyung-Choon Park, Gi-Chul Kweon and Sung-In Kim</i>	707
Prefabricated Vertical Drains in Geotechnical Engineering: State of the Art Review <i>M.A. Gabr, J.D. Quaranta, E.E. Cook and D.T. Mooney</i>	714
Improvement of Marine Clay by Quick Lime Pile <i>B.S. Chun, S.S. Kim, H.K. Yoo, B.K. Kang and K.H. Koh</i>	720
Case Histories on Monitoring Vibro-Driven Piles in Reclaimed Grounds <i>H. Tsuboi, T. Matsui and Y. Ando</i>	727

Shape Effect of Mandrels on Smear and Well Resistance of Plastic Drain Boards <i>Soo-Sam Kim, Yeon-Soo Jang, Min-Soo Kang and Kyung-Hwan Koh</i>	734
Pullout Behavior of Model Suction Anchors in Soft Marine Clays <i>S. Narasimha Rao, R. Ravi and C. Ganapathy</i>	740
An Important Consideration for Seismic-Resistant Design of Offshore Piles <i>P.M. Rao and M.W. O'Neill</i>	745
Horizontal Impact Loads on Large Bored Single Piles in Sand <i>Thomas Grundhoff</i>	753
Simulation of Suction Pile Installation in Sand in a Geocentrifuge <i>H.G.B. Allersma, F.J.A. Plenevaux and J.-F.P.C.M.E. Wintgens</i>	761
Prediction of Lateral Capacity of Piles in Clays from Standard Penetration Tests <i>Yenumula V.S.N. Prasad</i>	767
Response of Soil Plug to Horizontal and Vertical Excitation <i>Yongkyu Choi and Michael W. O'Neill</i>	772
Dependence of Pile Reliability on Load Uncertainty <i>G. Singh and W.T. Lai</i>	778
Vertical Capacity of Caisson Foundations in Calcareous Sediments <i>P.G. Watson and M.F. Randolph</i>	784
Finite Element Modelling of Skirted Strip Footings Subject to Combined Loadings <i>M.F. Bransby and M.F. Randolph</i>	791
Analysis of Anchor Mooring Lines in Sands <i>S. Bang and R.J. Taylor</i>	797
Piles and Shallow Foundations Under Cyclic Loadings <i>Jan Laue, Thomas Grundhoff and Hans L. Jessberger</i>	803
Cyclic Load-Induced Settlement of Shallow Foundations on Geogrid-Reinforced Layered Soil <i>Braja M. Das and K.H. Khing</i>	811
Dynamic Response of Square Foundation Vibration Using 3D Boundary Element Method <i>Sheng-Huoo Ni and Pay-Shiun Tsai</i>	815
The Study on the Electro Osmotic Consolidation of Marine Clayey Soil <i>Soo-Sam Kim, Kwang-Yeol Lee, Sang-Jae Han and Kyung-Hwan Koh</i>	821
Consolidation Analysis of Natural Clay by Flow Surface History Variable Model <i>Nobuharu Abe</i>	827
Bed Shear Stress Distribution Over a Composite Beach Profile <i>E. Özkan Çevik and Y. Yüksel</i>	832

Model Prediction of Stress-Strain Behavior on Cohesionless Soil	
<i>Robert Yun-Pin Chin</i>	835
Effect of Pre-Shearing with Drainage on Undrained Cyclic Shear Behaviour of Dense Sand	
<i>Ken-ichi Sato, Kazuya Yasuhara and Nobuo Yoshida</i>	842
Effects of Compression Rate on Unconfined Compressive Strength of Cohesive Soils: Evaluation Based on the Effective Stress	
<i>Masayoshi Shimizu</i>	850
Estimation of <i>In-situ</i> Consolidation Parameters and Prediction of Settlement Behavior of Embankment	
<i>Takaharu Shogaki, Yoshikazu Maruyama and Keiji Kogure</i>	855
Dynamic Response of Caisson with Suction and Its Foundation Due to Wave	
<i>Tomiya Takatani, Yoshi-hiko Maeno, Shigeo Takahashi and Ken-ichiro Shimosako</i>	861
Discontinuous Deformation Analysis on Seafloor Sliding Simulation	
<i>L.K. Chien and Y.N. Oh</i>	868
Improved Data Interpretation Method for SASW Tests at Complex Geotechnical Sites	
<i>Sung-Ho Joh, Brent L. Rosenblad and Kenneth H. Stokoe, II</i>	875
Consolidation Characteristics of Pleistocene Clays Under Wide Range of Applied Pressures	
<i>Tamotsu Matsui, Kazuhiro Oda, Yasuyuki Nabeshima and Kwang Hoon Yang</i>	882
Seepage Through an Embankment Computed by Grid Research Using FEM	
<i>Mahmudul Alam Chowdhury, Masato Kunitake and Fumiyoshi Kondo</i>	887
Shear Behavior of Remolded Clay in Strain Path Controlled Mini-Triaxial Test	
<i>Tamotsu Matsui, Kazuhiro Oda and Yasuyuki Nabeshima</i>	894
Drained and Undrained Behavior of Sand Under Cyclic Loading	
<i>T. Nakai, T. Hoshikawa and M. Hinokio</i>	901
Effect of Sample Disturbance on Consolidation Yield Stress of Ariake Clays	
<i>Zhenshun Hong and Katsutada Onitsuka</i>	907
A Small Diameter Sampler and the Quality of Its Samples	
<i>Takaharu Shogaki and Takashi Sudoh</i>	915
Stability of Heaps of Iron Ore Concentrate	
<i>Jan Laue</i>	921
A Feasibility Study of the Utilization of De-sulphurization Slag as Engineering Filling Materials	
<i>Der-Her Lee, Juu-En Chang and Yuin-Yao Jhi</i>	928
Effect of Internal Structure on Mechanical Behavior of Osaka Pleistocene Marine Clay	
<i>A. Yashima, F. Oka and H. Shigematsu</i>	933
A Novel Procedure for Testing Model Drag Anchors	
<i>M.P. O'Neill, M.F. Randolph and S.R. Neubecker</i>	939

Geotechnical Properties of Crude Oil-Contaminated Sand <i>E.C. Shin, J.B. Lee and B.M. Das</i>	946
Stabilization of Petroleum Contaminated Drilling Wastes by Additives <i>M. Tuncan, A. Tuncan and H. Koyuncu</i>	950
GIS Database of Irrigation Ponds Damaged by the 1995 Hyokoken-Nambu Earthquake <i>Kazunori Uchida</i>	954
ADDITIONAL PAPERS	
On the Role of Geologic Factors in Determining Peculiarities of Water Mass Structure in the Clarion-Clipperton Ore Field <i>G. Tkatchenko, R. Kotlinski, V. Stoyanova, Dehua Lian, Guozhen Zhang and Yongyang Huang</i>	959
Performance of a Wells Type Turbine Coupled to an Induction Generator for Wave Energy Applications <i>Ardhendu G. Pathak, V. Jayashankar and M. Ravindran</i>	962
A Study of Sedimentation Processes in Seamangeum Coastal Area <i>Moon Seup Shin, Tetsuo Yanagi and Sung Kun Hong</i>	966
Floating Wave-Energy Pump for Wide Wave-Range <i>H. Ueki, K. Kawaguty and S. Akamine</i>	973

The Proceedings of The Seventh (1997) International OFFSHORE AND POLAR ENGINEERING CONFERENCE

Honolulu, Hawaii, USA, May 25-30, 1997

VOLUME II, 1997

Offshore and Arctic Pipelines, Mechanics of Risers, Cables and Mooring, Underwater Vehicles, Control and Systems, Polar and Ice Engineering, JOIA Projects, Arctic and Antarctic Systems, Arctic Oil Pollution, Ice Remote Sensing

How to Use This Table of Contents

Scroll down or use the bookmarks in the left-side frame to move to a new location in this index. Click on a **blue paper title** you like to view.

To return to this index after viewing a paper, click on PREVIOUS MENU bookmark in the left-side frame.

This CD-ROM is created from the PDF files. The hard-copy originals in the proceedings are scanned and saved as PDF files. View quality of the text and graphics, the searchability and the ease of readability depend largely on the quality and/or consistency of the originals.

Copyright © 1997 by International Society of Offshore and Polar Engineers,
Golden, Colorado, USA. All Rights Reserved.

www.isopec.org: orders@isopec.org

International Standard Book Number: ISBN 1-880653-28-1 (Set)

Library of Congress Catalog Card Number: 97-70292

Indexed by Engineering Index, Compendex and Others

www.isopec.org: orders@isopec.org

edited by:

Jin S. Chung, Colorado School of Mines, Golden, Colorado, USA

Robert M.W. Frederking, National Research Council Canada, Ottawa, Canada

Hiroshi Saeki, Hokkaido University, Sapporo, Japan

Alexander T. Bekker, Far Eastern State Technical University, Vladivostok, Russia

presented at:

The Seventh (1997) International Offshore and Polar Engineering Conference held in Honolulu, USA, May 25-30, 1997

organized by:

International Society of Offshore and Polar Engineers

sponsored by:

International Society of Offshore and Polar Engineers (ISOPE)

with cooperating societies and associations

The publisher and the editors of its publications assume no responsibility for the statements or opinions expressed in papers or presentations by the contributors to this conference or proceedings.

International Society of Offshore and Polar Engineers (ISOPE)
P.O. Box 189, Cupertino, California 95015-0189 USA

CONTENTS

PLENARY PRESENTATIONS

The NorFra Pipeline Shore Approach: Engineering, Environmental and Construction Challenges

Bernt Thorbjørnsen, Henning Dale, Steinar Eldøy and Massimo Mercanti..... 1

Instrumentation and Research Program on Confederation Bridge

M.S. Cheung..... 10

UNDERWATER VEHICLE SYSTEMS

Experimental Study of the Dynamic Behaviour of a Towed System

G. Duvat and C. Large..... 17

Advanced Tethered/Non-Tethered Control System for a Large Underwater Vehicle

Xiaocheng Shi and Xinqian Bian..... 26

A Study on Hydrodynamic Characteristics of a Towed Vehicle

Satoru Yamaguchi, Wataru Koterayama and Eiji Sasaki..... 30

Coupled Motion Simulation of Underwater Towed and Self-Propulsive Vehicle

Ke-Qiang Zhu and Wei-Yang Li..... 38

3-D Simulation of a Two-Part Underwater Towed System <i>Jiaming Wu and Allen T. Chwang</i>	44
LMI-Based Design of Robust Controllers for an Underwater Vehicle <i>Hiroyuki Kajiwara, Wataru Koterayama, Masahiko Nakamura and Shigeru Yugawa</i>	51
The Problem of Synthesis of the Most Effective System for Supporting a Heat Balance in a Diving Chamber of the Hyperbaric Lifeboats <i>O.A. Kozyrko, Y.V. Zacharov, E.I. Trushlyakov and P.A. Chegrintsev</i>	57
Bifurcation and Normal Forms of Dive Plane Reversal of Submersible Vehicles <i>Wei Kang and Fotis A. Papoulias</i>	62
New Experimental Results on Shallow-Water Autonomous Underwater Vehicle Motion in Controlled Environments <i>P.E. An, S.M. Smith, S.E. Dunn, X. Chen and L. Mu</i>	69
Exploring the Possibility of Placing Traditional Marine Vessels Under Oscillating Foil Propulsion <i>J. Czarnowski, R. Cleary and B. Kreamer</i>	76
Concept Design of a Flexible-Hull Unmanned Undersea Vehicle <i>Jamie M. Anderson, Michael S. Triantafyllou and Peter A. Kerrebrock</i>	82
AUV Platform Requirements for Ambient Turbulence Measurement <i>Manhar R. Dhanak and Ken Holappa</i>	89
A Hybrid Navigation System for Underwater Robotic Vehicles <i>Pan-Mook Lee, Chong-Moo Lee, Seong-Wook Cheong, Jae-Seok Oh and Jun-Ho Oh</i>	93
Sensor Data Fusion in Marine Robotics <i>John J. Leonard and Christopher M. Smith</i>	100
MECHANICS OF RISERS, ABLES AND MOORING	
Reentry of Deepsea Riser by Adaptive Control <i>Dongho Nam, Hideyuki Suzuki and Koichiro Yoshida</i>	107
Application of Thrusts to Elastic Joints of Long Vertical Pipe in 3-D Nonlinear Motions: Part I. MSE and FEM Modeling <i>Jin S. Chung, Baorong Cheng and Zhao-Chang Zheng</i>	115
Dynamics of Deep Water Marine Risers - Asymptotic Solutions <i>Geir Moe and Bjørn Larsen</i>	123
Effect of Axial Deformation on Natural Frequencies of Marine Cables <i>Somchai Chucheepsakul and Tseng Huang</i>	131
Structural Analysis of Flexible Pipe Using Finite Element Method <i>Flavio Torres Lopez da Cruz and Carlos Alberto Nunes Dias</i>	137

Fatigue Performance of Deep Water Rigid Marine Risers <i>G.F.M. de Souza and E. Gonçalves</i>	144
Dynamical Measurements of the Bending Stiffness of Taut Cables <i>Peter Hagedorn and Ulrich Gutzer</i>	152
Analysis of Resonant Tangential Response in Submerged Cables Resulting from 1-to-1 Internal Resonance <i>B.L. Newberry and N.C. Perkins</i>	157
Installation Options for Deployment of Light-Weight Telecommunications Cable <i>James J. Burgess</i>	164
Axial Fatigue of Spiral Strands in Offshore Platform Applications <i>M. Raoof and M. Alani</i>	169
Transition in the Wake of Flexible Cables and Beams <i>C. Evangelinos and G.E. Karniadakis</i>	177
Simplified Catenary Force-Deflection Analysis <i>John F. Flory</i>	185
Nonlinear Contributions in Predicting Dynamic Tensions on Mooring Lines for High and Low Frequencies of Excitation <i>J.K. Chatjigeorgiou and S.A. Mavrakos</i>	192
A Synthesis Procedure of Mooring System to Reduce Costs and Simplify the Underwater Layout <i>B.L.R. Andrade, M.R. Martins and H.L. Brinati</i>	200
OFFSHORE AND ARCTIC PIPELINES	
Transport Support for Oil and Gas Production Facilities on the Sakhalin Offshore <i>A.M. Polomoshnov and S.V. Astafiev</i>	208
A Numerical Simulation to Determine Ice Scour and Pipeline Burial Depth <i>Ki-Young Yoon, Kyungsik Choi and Han-Il Park</i>	212
Sour Resistant X65 UOE Line Pipe for Low-Temperature Service <i>Y. Terada, H. Tamehiro, H. Ishikawa, M. Sugiyama, R. Chijiwa and N. Ayukawa</i>	220
Technological Regimes of the Natural Gas Transport by Marine Pipelines with Shtokmanovskoe Gas Condensate Field, Barentsevo Sea <i>N.G. Figarov, V.V. Rusakova and A.S. Tsourikov</i>	226
An Introduction to the DNV 1996 Rules for Submarine Pipeline Systems <i>Leif Collberg, Tommy Bjørnsen and Kim J. Mørk</i>	233
Stability of Pipeline in Curved Route During Offshore Pipeline Installation <i>H. Shin, J.B. Kim and Chul H. Jo</i>	243

Prevention of Hydrate Formation in Pipelines by Electrical Methods <i>Jens Kristian Lervik, Harald Kulbotten and Gunnar Klevjer Norway</i>	249
Force and Vortex Shedding Characteristics of a Circular Cylinder Near a Plane Boundary <i>C. Lei, K. Kavanagh and L. Cheng</i>	255
Wave Induced Forces on a Submarine Pipeline <i>F. Raichlen and A. Watanabe</i>	261
Local Scour Around Submarine Pipelines Under Wave Conditions <i>E. Özkan Çevik and Y. Yüksel</i>	269
The Numerical Simulation of Wave Forces on Seabed Pipeline by Three-Step Finite Element Method and Large Eddy Simulation <i>Yucheng Li, Bing Chen and Guozhang Lai</i>	273
The Norfra Pipeline: Challenging Shore Approach Handled by Coastal Dynamics Modelling <i>Hermann Moshagen, Bernt Thorbjørnsen, Per Strass, Bernard Latteux and Marco Venturi</i>	278
An Interface Beam Element for the Analyses of Soil-Structure Interactions and Pipelines <i>H. Karadeniz</i>	286
Expansion Analysis of Subsea Pipe-in-Pipe Flowline <i>Gary E. Harrison, Naum Y. Kershenbaum and Han S. Choi</i>	293
3-D Dynamic Buckling and Cyclic Behaviour of HP/HT Flowlines <i>Per R. Nystrøm, Knut Tørnes, Yong Bai and Per Damsleth</i>	299
Elastic-Plastic Analysis of a Thick-Walled Submarine Pipeline Considering Plastic Compressibility <i>C.H. Shin</i>	308
Intrinsic Coordinate Elements for Large Deflection of Offshore Pipelines <i>Poh C. Andrew Ngiam</i>	313
The Behaviour of High Pressure, High Temperature Flowlines on Very Uneven Seabed <i>Knut Tørnes, Per R. Nystrøm, Per Damsleth and Lars H. Sortland</i>	321
Bends in Steel Pipelines: A New Analytical Model to Calculate Stresses, Strains and Deformations <i>J. Mennink, A.M. Gresnigt, J. Blaauwendraad and P.Ph.C. Coors</i>	330
Analytical Methods for the Determination of Allowable Free Span Lengths of Subsea Pipelines <i>H.I. Park and C.H. Kim</i>	337
Non-Linear Finite Element Prediction of Wrinkling in Corroded Pipe <i>Daniel P. Nicolella and Marina Q. Smith</i>	343

POLAR AND ICE ENGINEERING

JOIA Project of Study on Ice Load

Hiroshi Saeki, Ken-ichi Hiyayama, Tetsuro Kawasaki, Satoshi Akagawa, Kazuyuki Kato, Kazuhiko Kamesaki, Koji Saka and Akira Kurokawa..... 349

Distinct Element Simulation of Ice Sheet Failure Against Offshore Structures

K. Katsuragi, M. Ochi, H. Seto and T. Kawasaki 356

Simulation of Ice Loads on a Conical Shaped Structure: Comparison with Experimental Results

Kazuyuki Kato and Koh Izumiyama..... 360

Medium Scale Field Indentation Tests - Physical Properties and Strength of the Ice Sheet

H. Matsushita, T. Takawaki, K. Masaki, M. Hanada, H. Honda, A. Nishihata, H. Saeki and K. Hirayama..... 368

Medium-Scale Field Indentation Tests (MSFIT) - Ice Failure Characteristics in Ice/Structure Interactions

Takahiro Takeuchi, Takaharu Masaki, Satoshi Akagawa, Muneo Kawamura, Naoki Nakazawa, Takashi Terashima, Hideki Honda, Hiroshi Saeki and Ken-ichi Hirayama..... 376

Medium-Scale Field Indentation Tests: Measurements of Ice Sheet Deformation Under Ice-Structure Interactions by Means of Photogrammetry

M. Sakai, M. Aoshima, H. Katsui and M. Suzuki 383

Experimental Studies on Nonsimultaneous Failure Characteristics of Vertical Sided Indentors

Kazuhiko Kamesaki, Hiroyuki Tsukuda and Yutaka Yamauchi 387

Thermal Stressing of Pack Ice

James K. Lewis..... 394

The Ductile Deformation of Columnar (S2) Saline Ice Under Triaxial Compression

Jeffrey S. Melton and Erland M. Schulson..... 402

Flexural Strength of Ice with Non-Uniform Thickness

G.W. Timco and A.M. Cornett 410

Temperature Effect on Strength of Ice Under Triaxial Compression

Anatoly M. Fish and Yuri K. Zaretsky 415

Ice Floe Collisions: A Neglected Attribute of Wave Dissipation in Ice Fields

Vernon A. Squire and Hayley H. Shen..... 423

Discrete and Lattice Models of Floating Ice Covers

Mohamed Sayed..... 428

Assessment of the Wave-Iceberg Load Combination Factor

Ricardo Foschi, Michael Isaacson, Norman Allyn and Ibrahim Saady..... 434

Ice Boom Loads in the St. Lawrence River, 1994-95 & 1995-96

A. Cornett, R. Frederking, B. Morse and S. Dumont..... 442

Ridge Ice Loads on Proposed Faceted Conical Structure <i>Zhiguo Wang, Derek B. Muggeridge and Ken. R. Croasdale</i>	449
Vertical Ice Forces on Large-Diameter Marine Structures Under Water Level Changes <i>Takashi Terashima, Naoki Nakazawa, Akifumi Nishihata, Hideki Honda and Takaharu Kawai</i>	457
Method of Ridge Ice Force Analysis on Offshore Structures <i>Alexander T. Bekker, Olga A. Komarova and Sergey L. Vasiljev</i>	461
Experimental Study of the Friction of Ice Over Concrete at the Centimetre Scale <i>B. Fiorio, J. Meyssonier and M. Boulon</i>	466
Abrasion of Steel Sheet Piles Due to Ice Flow Movements <i>Takashi Terashima, Masakuni Hanada, Takaharu Kawai, Kaori Oshima and Fumihiko Hara</i>	473
Discrete Element Modelling of the Local Interaction Between a Stationary Structure and a Moving Ice Pack <i>K. Sepehr, A.P.S. Selvadurai and G. Comfort</i>	480
Design Parameters for Hummocks and Grounded Hummocks in the Sea of Okhotsk <i>S.P. Beketsky, V.N. Astafiev and P.A. Truskov</i>	487
Description of Sea Ice Regime for Offshore Construction <i>A.T. Bekker and I.L. Appel</i>	494
A Methodology for Developing a Scientific Basis for the Ice Regime System <i>G.W. Timco, R.M.W. Frederking and V.M. Santos-Pedro</i>	498
Real-Time Monitoring of River Ice Floes <i>Brian Morse, Marc Choquette and Marc Savard</i>	504
Ice Conditions in an Anisotropic Sea Ice Dynamics Model <i>R.S. Pritchard</i>	508
Numerical Modeling of Ice State for Ship Operation <i>I. Appel</i>	514
On the Damage of Skeg and Steering Gear of the M/V "Stepan Krasheninnikov" in the Antarctic Ice <i>N. Barabanov, A. Moskalenko and E. Lapin</i>	521
Landing and Parking Curves for the C-17 Globemaster on Sea Ice: McMurdo Station, Antarctica <i>Joseph L. Barthelemy</i>	523
Development of a Modern Heavy-Haul Traverse for Antarctica <i>George L. Blaisdell, Paul W. Richmond, Fred C. Kaiser and Russell G. Alger</i>	529
The Polar Ice Prediction System (PIPS 2.0) - the Navy's Sea Ice Forecasting System <i>Pamela G. Posey and Ruth H. Preller</i>	537

Characteristics of Frequency Spectra of Wind Waves in the Presence of Sea Ice
Tetsuya Hayakawa, Takahiko Sasajima, Masafumi Yoshino and Chiaki Goto 544

An Analysis of Wave Fields Around a Flexible Sheet Structure with Green Function Method
Ken-ichiro Hamanaka and Masaya Kato 551

ARCTIC POLLUTION

Arctic Shoreline Oil Combatting Experiments in 1996 in Murmansk
Jorma Rytkönen, Reetta Piskonen, Merja Itävaara, Gennady Matishov, Vladimir Petrov and Gennady Iluyin..... 558

The Improvement of Oil Bioremediation on the Shoreline
Jorma Rytkönen, Merja Itävaara and John E. Paulsen 565

Pollution Abatement at McMurdo Station, Antarctica
Erick Chiang, Shih-Cheng Chang and Arthur J. Brown..... 572

On the Adhesion of Oil to Ice
Seppo Liukkonen, Jorma Rytkönen, Alexander Alhimenko and Elena Kniazeva..... 579

In-Situ Burning: An Alternative Approach to Oil Spill Clean-Up in Arctic Waters
Chantal C. Guénette..... 587

Modelling Oil Pollution Under Ice Cover
A. Alhimenko, A. Bolshev, A. Yakovlev, K. Klevanny and S. Liukkonen..... 594

Study of Polluted Air Masses Coming Ways into Arctics
A.M. Prokhorenkov and A.S. Sovlukov 602

Source Locations of Contaminated Sea Ice Derived Using Backward Trajectories from an Ice-Ocean Model
Ruth H. Preller and Pamela G. Posey 608

Intelligent Sensor Protection System for Polar and Marine Environments
Peter J. Stein, Armen Bahlavouni and Douglas W. Andersen 615

Application of the Pivot Point on FCP Diagram to Low-Temperature Fatigue of Materials
Meng-Lan Duan, James C.M. Li and Jing Li..... 621

ATMOSPHERIC ICING

A Laboratory Simulation of Wet Icing Build-up on H.V. Insulators
M. Farzaneh and J.-L. Laforte..... 626

A Theoretical Investigation of the Distribution of Freshwater Spongy Spray on a Vertical Cylinder
R.Z. Blackmore and E.P. Lozowski..... 633

Atmospheric Icing on Cables of Different Flexibilities
Pierre McComber, Jacques Druetz and Jean Laflamme 640

Ice Accretion and Shedding on Overhead Line Cables
Jacques Druetz and Pierre McComber..... 647

ADDITIONAL PAPERS

Dynamic Curvature in Catenary Risers at the Touch Down Point: An Experimental Study and the Analytical Boundary-Layer Solution
C.P. Pesce, J.A.P. Aranha, C.A. Martins and O.G.S. Ricardo and S. Silva 656

A Simplified Analysis of Imperfect Thermally Buckled Subsea Pipelines
James G.A. Croll..... 666

Development of a Russian Standard for Submarine Pipeline Design, Installation and Operation
M.A. Kamyshev and J.G. de Vries..... 677

Limit Force Ice Loads and Their Significance to Offshore Structures in the Beaufort Sea
G. Comfort, S. Singh and A. Dinovitzer 686

Wave-Induced Behaviour of a Submarine Pipeline Laid on an Erodable Bottom: Full-Scale Experiments
W. Dursthoff, W. Magda, T. Marcinkowski and B. Mazurkiewicz..... 693

The Proceedings of The Seventh (1997) International OFFSHORE AND POLAR ENGINEERING CONFERENCE

Honolulu, Hawaii, USA, May 25-30, 1997

VOLUME III, 1997

**Numerical Waves, Nonlinear Waves, Wave Statistics and Measurements, Internal Waves,
Hydrodynamic Forces, Dynamic Responses, Airgap and Metocean, Vortex Shedding
and Flow-Induced Vibrations, Coastal Hydrodynamics**

How to Use This Table of Contents

Scroll down or use the bookmarks in the left-side frame to move to a new location in this index.
Click on a **blue paper title** you like to view.

To return to this index after viewing a paper, click on PREVIOUS MENU bookmark in the left-side frame.

This CD-ROM is created from the PDF files. The hard-copy originals in the proceedings are scanned and saved as PDF files. View quality of the text and graphics, the searchability and the ease of readability depend largely on the quality and/or consistency of the originals.

Copyright © 1997 by International Society of Offshore and Polar Engineers,
Golden, Colorado, USA. All Rights Reserved.

www.isopec.org: orders@isopec.org

International Standard Book Number: ISBN 1-880653-28-1 (Set)

Library of Congress Catalog Card Number: 97-70292

Indexed by Engineering Index, Compendex and Others

www.isopec.org: orders@isopec.org

edited by:

Jin S. Chung, Colorado School of Mines, Golden, Colorado, USA

C.H. Kim, Texas A & M University, College Station, Texas, USA

Michel Olagnon, Ifremer, Plouzane, France

Shigeru Naito, Osaka University, Osaka, Japan

presented at:

The Seventh (1997) International Offshore and Polar Engineering Conference held in Honolulu, USA, May 25-30, 1997

organized by:

International Society of Offshore and Polar Engineers

sponsored by:

International Society of Offshore and Polar Engineers (ISOPE)

with cooperating societies and associations

The publisher and the editors of its publications assume no responsibility for the statements or opinions expressed in papers or presentations by the contributors to this conference or proceedings.

**International Society of Offshore and Polar Engineers (ISOPE)
P.O. Box 189, Cupertino, California 95015-0189 USA**

CONTENTS

PLENARY PRESENTATIONS

On the Contribution of Swell to Sea Surface Phenomena

Hisashi Mitsuyasu..... 1

On the Dynamics and Control of Fluid-Structure Interaction Instabilities

V.J. Modi, M.L. Seto and S.R. Munshi..... 8

AIRGAP AND METOCEAN

Wave-in-Deck Forces

Timothy D. Finnigan and Chuck Petruskas..... 19

Assessment of Mean Water Levels and Tides from Satellite Data

C. Le Provost, F. Rabilloud and M. Olagnon..... 25

Contribution of Satellite Data to Storm-Surge Climatology

Hafedh Hajji and Michel Olagnon..... 32

SUCCESS: A Joint Project to Use Novel Techniques to Teach Future Engineers About Satellite Metoccean Data Sources	
<i>Michel Olagnon and Georg Lindgren</i>	38
Satellite Measurements and Their Application to the Pechora Sea	
<i>Hafedh Hajji and Richard A. Sproson</i>	42
HYDRODYNAMICS: Waves	
Runup on a Structure Due to Waves and Current	
<i>Bjarne Büchmann, Jesper Skourup and Kwok Fai Cheung</i>	48
A Rational Approach to Free Surface Flow by Using Higher-Order Boundary Elements	
<i>Hong G. Sung, Sa Y. Hong and Hang S. Choi</i>	56
Open Boundary for Horizontally 2-D Wave Analysis with Boundary Element Method	
<i>Ken-ichiro Hamanaka and Yukio Sato</i>	63
A Study on Parametric Roll Motions by Fully Nonlinear Numerical Wave Tank	
<i>Katsuji Tanizawa and Shigeru Naito</i>	69
Nonlinear Irregular Waves and Forces on Truncated Vertical Cylinder in a Numerical Wave Tank	
<i>S.Y. Boo and C.H. Kim</i>	76
Wave Generation and Active Absorption in a Numerical Wave Flume	
<i>Jesper Skourup and Hemming A. Schäffer</i>	85
Numerical Simulation of Short Wave-Wave Interaction	
<i>A. Clément and L. Gil</i>	92
Development of a Viscous Numerical Wave Tank and Numerical Evaluation of Dynamic Loads on Submerged Bodies at Small KC Numbers	
<i>V. Armenio and M. Favretto</i>	98
Wave-Current-Body Interaction by a Time-Domain High-Order Boundary Element Method	
<i>D.J. Kim and M.H. Kim</i>	107
Numerical Simulation for the Wave Resistance of a Submerged Spheroid	
<i>Chung-Chyi Lee and Ming-Chung Fang</i>	116
Non-linear Internal Wave Kinematics	
<i>Alastair J. Martin and William J. Easson</i>	122
Nonlinear Models of Internal Tide and Internal Solitary Wave Evolution Over a Continental Slope	
<i>Peter E. Holloway, Efim Pelinovsky, Tatyana Talipova and Belinda Barnes</i>	130
Temporal Behaviour of a Mixed Layer in a Stratified Flow	
<i>S.A. Walker, G.A. Hamill, H.A. Barnes and H.T. Johnston</i>	138

Internal Tide Driving of Estuarine-Shelf Water Exchange <i>Tateki Fujiwara, Tetsuya Takahashi and Katsuyuki Abo</i>	144
A Flow Field Over Upwelling Producing Structure in an Oscillatory Flow with or without Stratification <i>G. Tsujimoto, K. Michioku and H. Nishide</i>	149
Shallow Water Equilibrium Range Waves <i>R.-Q. Lin and W. Perrie</i>	156
On Some Characteristics of Breaking Waves Generated by a Submerged Circular Cylinder <i>Beom-Soo Hyun and Yong Heon Shin</i>	162
Analysis of Near-Crest Pressure Gradient of Irregular Water Waves as a Dynamic Criterion of Breaking <i>K. Nadaoka, O. Ono and H. Kurihara</i>	170
Shallow-Water Nonlinear Wave Instabilities and Energy Transfer <i>Ming-Yang Su</i>	175
Experimental Studies on Energy Dissipation in Breaking Waves <i>Jun Zhang, Eustorgio Meza Conde and Richard J. Seymour</i>	178
Generation of Second-Order Long Waves at Depth Discontinuity <i>Hiroaki Toita and Masaru Mizuguchi</i>	184
Internal Characteristics of Breaking Waves Over Submerged Breakwaters <i>Kiyoshi Takikawa, Fumihiko Yamada and Kensaku Matsumoto</i>	192
Breaking Waves and Offshore Design <i>William J. Easson</i>	200
Analysis of Ocean Waves by Crossing- and Oscillation-Intensities <i>I. Rychlik and M.R. Leadbetter</i>	206
Long Waves Accompanied by the Reflection of Short-Wave Groups <i>Wataru Kioka, Satoru Yamane, Kenji Kashihara and Shin-ichi Aoki</i>	214
Performance of Active Wave Absorption Systems: Comparison of Wave Gauge and Velocity Meter Based Systems <i>Tue Hald and Peter Frigaard</i>	221
Simulation of Design Storm Wave Conditions with Tailored Wave Groups <i>Günther F. Clauss and Walter L. Kühnlein</i>	228
Upstream Soliton Generation by a Slender, Vertical Strut and Ship: Boussinesq Equations <i>R.C. Ertekin, Z.M. Qian and J.V. Wehausen</i>	238
Three-Dimensional Characteristics of Velocity Field and Effects of Undertow in a Surf Zone <i>Y. Watanabe and N. Mori</i>	247

Characteristics of Long-Period Waves Observed in a Port <i>Tetsuya Hiraishi</i>	254
Accuracy Estimates of Multidecade Return Period Wind Velocity Values Over Shelf <i>Vladimir N. Kryjov</i>	259
Statistic Comparison Between Wave Height Time Histories from Different Simulation Techniques for a Campeche Bay Sea State <i>Jorge Silva-Ballesteros and Federico Barranco-Cicilia</i>	265
A Wave Climate Study for an LNG Terminal Near Marmara Ereğlisi, Turkey <i>Adnan Akyarlı and Ahmet C. Yalciner</i>	272
A Wave/Wind Climatology for the Gulf of Mexico <i>W.J. Teague, P.A. Hwang, D.W.-C. Wang, E.F. Thompson and G.A. Jacobs</i>	279
Effects of a Submerged Dike on the Statistical Properties of a Random Wave Field <i>Jaw-Guei Lin and John Z. Yim</i>	287
Solitons, Positons and Trains of Algebraically Decaying Waves <i>K.W. Chow and K. Tso</i>	292
Effect of Boundary on Ship Waves <i>Sing-Kwan Lee and Allen T. Chwang</i>	296
Active Wave Control by a Pitching Porous Plate <i>T.L. Yip and Allen T. Chwang</i>	302
A Perturbation-DRBEM Model for Wave Refraction-Diffraction <i>S.S. Hsiao, J.H. Wu and Y.F. Chiu</i>	308
Nonlinear Shallow Water Waves Generated by Submerged Moving Slender Bodies: An Experimental Study <i>Michelle H. Teng and Theodore Y. Wu</i>	313
Irregular Broken Wave Forces on Vertical Wall <i>Yu-cheng Li, Da-zhong Liu, Gui-ping Qi and Shiao-jun Su</i>	318
Viscous Effects in Wave-Body Interaction <i>M. Landrini, M. Ranucci, C.M. Casciola and G. Graziani</i>	327
Optimum Dynamic Response of a Floating Vessel Restrained by Cables: A Parametric Analysis <i>A. Carcaterra, M. Landrini and C. Lugni</i>	336
Second-Order Approximate Solution of Nonlinear Wave Diffraction Due to a Cylinder in Directional Sea <i>Norimi Mizutani, Takeshi Sanada, Akira Imai, Koichiro Iwata, Masumi Watanabe and Yoon-Koo Kang</i>	345
A Nonlinear Spectral Model for Directional Random Waves in Decreasing Depths <i>Laura Rebaudengo Landó, Renata Gentile and Giulio Scarsi</i>	353

Effects of Spectral Width on the Statistical Properties of Simulated Random Wave Fields <i>John Z. Yim and Jaw-Guei Lin</i>	362
A Weibull-Stokes Model for the Distribution of Maximum Wave and Crest Heights <i>Raymond Nerzic and Marc Prevosto</i>	367
The Relation Between Wave Length and Wave Period Distributions in Random Gaussian Waves <i>Georg Lindgren, Igor Rychlik and Marc Prevosto</i>	378
Spectral Modeling of Unidirectional Nonlinear Wave Propagation Over Arbitrary Depths <i>S. Beji and K. Nadaoka</i>	385
The Measurement of Acceleration Fields Under Waves by DPIV <i>T.P. Dewhurst, M.L. Jakobsen and C.A. Greated</i>	390
HYDRODYNAMICS: Forces	
A Free-Surface Pressure Distribution Solution for the Radiation and Diffraction Problems of Large-Diameter Piles <i>G.P. Miao, Y.X. You and Y.Z. Liu</i>	395
Predictions of Morison Type Forces in Irregular, High Reynolds Number Waves <i>Geir Moe and Ove Tobias Gudmestad</i>	399
Estimation Method of Viscous Forces Acting on Floating Offshore Structures <i>Kunihiro Hoshino, Shunji Kato and Wataru Koterayama</i>	407
Hydrodynamic Forces Acting on a Bottom Mounted Circular Cylinder <i>Ian A.R. Neill and Jon B. Hinwood</i>	415
A Simple Procedure for the Wave Impact Forces for Circular Structure Member in Breaking Wave Zone <i>Kyu Nam Cho and Jae Joon Yoon</i>	423
The Force Acting on a Horizontal Cylinder Passing Through the Water Surface <i>M. Uchida, K. Hu and T. Nishijima</i>	427
Stochastic Analysis of Combined Wave and Current Loading on a Vertical Cylinder from Large-Scale Laboratory Experiments <i>G. Najafian, R. Burrows and R.G. Tickell</i>	435
The Influence of Grouping on the Force Characteristics of Pairs of Vertical Surface-Piercing Cylinders <i>D. Smith and N. Haritos</i>	443
Runup on Columns in Large Waves <i>A.J. Martin, W.J. Easson and T. Bruce</i>	449
Wave Runup Effects on Large Diameter Caissons in Shallow Water <i>R. Armstrong and N. Haritos</i>	453

Wave Enhancement Due to Structure Block in Semi-Submersibles	
<i>T. Bruce and W.J. Easson</i>	461
Hydrodynamic Analysis of Floating Bodies on Parallel Computers	
<i>B. Padmanabhan and R.C. Ertekin</i>	467
Drag Coefficients for Mooring Line Hydrodynamic Damping	
<i>G.J. Lyons, D.T. Brown and H.M. Lin</i>	473
Heave Force on a Slender Submerged Body with Application to Form Optimization of Ocean Structure	
<i>A.N. Simos and J.A.P. Aranha</i>	480
HYDRODYNAMICS: Responses	
Safety of Life at Sea: Lessons Learned from the Analysis of Casualties Involving Ferries	
<i>Giulio Russo Krauss and Antonio Cardo</i>	484
Survival Analysis of a Deep-Water Floating Offshore Platform About Its Critical Axis Including Coupling	
<i>Ravikiran S. Kota, Jeffrey M. Falzarano and Alexander Vakakis</i>	492
On the Roll Radius of Gyration of Ro-Ro Passenger Ships	
<i>A. Papanikolaou, E. Boulougouris and D. Spanos</i>	499
An Investigation on the Applicability of Simplified Mathematical Models to the Roll-Sloshing Problem	
<i>Alberto Francescutto and Giorgio Contento</i>	507
Effect of Water Inside a Ship on Its Damage Stability	
<i>Roby Kambisseri, Tetsuya Hamano and Yoshiho Ikeda</i>	515
Characterisation of the Flooding Process of a Damaged Ro-Ro Vessel	
<i>D. Vassalos and L. Letizia</i>	523
Field Experiments and Numerical Prediction on Dynamics of a Light Floating Structure Moored in Deep Ocean	
<i>Wataru Koterayama, Hiroo Mizuoka, Naoyuki Takatsu and Tetsuro Ikebuchi</i>	533
Field Observation of Ship Motions Using Multi Camera Trackers	
<i>Katsuhiko Saito and Masayoshi Kubo</i>	541
Observation of Long Period Wave and Ship Motion in Tomakomai-port	
<i>Tetsuya Hiraishi, Youichi Atsumi, Atsushi Kunita, Shin-ichiro Sekiguchi and Tsutomu Kawaguchi</i>	546
Nonlinear Wave Loads on a Ship Advancing in Waves	
<i>Ming-Chung Fang and Cheng-Ming Liao</i>	552
Time-Domain Prediction of Ship Motions with Experimental Verification	
<i>Dexiang Zhu and Mahmoud Katory</i>	559

The Effects of Binding Hinge Connections in Multipli-Connected Pontoon Arrays <i>A. Nobakhti, G.J. Lyons and D.T. Brown</i>	564
Dynamic Responses of a Spar-Buoy Boring Derrick in Waves <i>Koji Otsuka, Yoshiho Ikeda, Mikio Fukutomi and Hiroshi Aso</i>	573
Time-Domain Simulation of a Berthing DDG-51 Ship by a Domain Decomposition Approach <i>Hamn-Ching Chen, Miaomou Chen, D.A. Davis and Erick T. Huang</i>	580
Effects of Slenderness and Flatness on Wave Drift Damping of a Moored Floating Body <i>Takeshi Kinoshita, Weiguang Bao and Rong Zhu</i>	588
Motional Dynamics of Coupled Pontoons in Seaways <i>Erick T. Huang</i>	596
Interaction Between Twin Floating Power Plant Motions in Short-Crested Waves <i>Masaaki Ikeno and Ryoichi Kajima</i>	602
A Time Domain Analysis of Moored Ship Motions in a Harbor Considering Harbor Oscillations <i>Masayoshi Kubo and Shigeki Sakakibara</i>	610
Hydrodynamic Response of a Bottom Mounted Flexible Membrane Structure in Gravity Waves <i>Amal C. Phadke and Kwok Fai Cheung</i>	617
Nonlinear Dynamic Motions of Discus Buoys <i>S.C.S. Yim, K. Idris and J.W. Leonard</i>	625
Dynamic Positioning System Based on Nonlinear Programming for Offshore Platforms <i>Ikuo Yamamoto, Masami Matsuura, Youichi Yamaguchi, Katsunori Shimazaki and Akio Tanabe</i>	632
Control System Design and Model Experiments on Thruster Assisted Mooring System <i>Masahiko Nakamura, Hiroyuki Kajiwara, Wataru Koterayama and Tadahiro Hyakudome</i>	641
Estimation of Dynamic Towline Tension During Towing by the Probabilistic Method <i>Shoichi Hara</i>	649
Noise-Induced Transitions in Moored Ocean Structural Responses <i>H. Lin and S.C.S. Yim</i>	659
Development of a Model Scale Dynamic Positioning System <i>Sa Y. Hong, Hyun J. Kim and C.M. Lee</i>	664
Three-Dimensional Wave-Body Interactions in a Viscous Fluid: Heave Oscillation of a Submerged Vertical Cylinder <i>P. Ananthakrishnan</i>	672
VORTEX AND FLOW-INDUCED VIBRATIONS	
Vortex-Induced Vibration Tests of a Flexible Smooth Cylinder at Supercritical Reynolds Numbers <i>D.W. Allen and D.L. Henning</i>	680

Study on Vortex Shedding Modes from an Impulsively Started Rotating and Translating Circular Cylinder	
<i>Xuequan E and Caimao Luo</i>	686
Experimental Analysis of the Wake Instabilities of an Oscillating Cylinder Near Synchronization: Influence of the Amplitude Parameter	
<i>O. Rodriguez</i>	694
Numerical Prediction of the Response of a Vortex-Excited Cylinder at Low Reynolds Numbers	
<i>Trond Stokka Meling and Joar Dalheim</i>	702
Experimental Nearfield Flow Maps of a Cylinder in a Reversing Flow	
<i>E.F. Medeiros, M.P. Brandão and R.W. Miksad</i>	710
A Numerical Procedure for Predicting Transverse Forces on a Body Submitted to Lock-In Motion	
<i>Joar Dalheim</i>	718
Control of Fluid-Structure Interaction Instabilities Using Circular Cylindrical Nutation Dampers	
<i>M.L. Seto and V.J. Modi</i>	726
COASTAL HYDRODYNAMICS	
Wave Forces on Vertical Breakwaters by Wave Overtopping	
<i>Ching-Piao Tsai and Po-Hung Yeh</i>	735
Coastal Dynamic Characteristics of Breaker-Induced Vortices in the Surf Zone	
<i>Daping Zhang and Shigenobu Tanaka</i>	740
Experimental Study on Anchor Wire Type Automatic Installation System of Offshore Breakwaters	
<i>H. Yoneyama, S. Shiraishi, K. Nazato and H. Takahashi</i>	745
A Simple Device to Increase the Safety of Vertical Breakwaters	
<i>P. De Girolamo, A. Noli, A. Togna and M. Pittori</i>	753
A Parametric Study on the Dynamic Response of Vertical Breakwaters Under Impulsive Wave Loads	
<i>E. Benassai, M. Calabrese and F. Silvestri</i>	759
Wave Transmission Past Slotted Barriers	
<i>Michael Isaacson, Sundarlingam Premasiri and Gang Yang</i>	766
Hydrothermodynamic Model of the Ob and Tas Rivers Estuary	
<i>B.V. Arkhipov, V.V. Solbakov and A.S. Tsvetsinsky</i>	772
A Study of Anti-Collision Facilities of Quay Wall: A Two-Leg Fender	
<i>Su-Liek Shih, Hui-Ming Fang and Te-Hsung Hsu</i>	778

Stability Assessment of Rubble Mound Breakwater and Armor Layer <i>Hajime Mase and Tomotsuka Takayama</i>	782
Oblique Wave Reflection from a Breakwater <i>Zhao-Chen Sun</i>	786
Nonlinear Wave Field Induced by Offshore Shoals and Vertical Structures <i>Eric C. Cruz and Toshio Aono</i>	791
Resonance Phenomenon Developed by Breakwater or Breakwater Fixed on Piles <i>C. Colmard, M. B�elorgey and P. Roger</i>	798
Flow Due to a Moving Pressure Distribution on Free Surface with Finite-Depth Bottom <i>Noriaki Okita and Iskender Sahin</i>	804
Time Domain Analysis of Ship-Generated Waves in Harbour Using a Fast Hierarchical Method <i>Ding Li and Allen T. Chwang</i>	811
Numerical Simulation of Wave Run-Up and Breaking on a Sloping Beach* <i>Decheng Wan, Guoping Miao and Shiqiang Dai</i>	817
Numerical Analysis of Dynamic Interaction Between Non-Linear Waves and Permeable Toe Over Sand Seabed in Front of a Seawall <i>Ayman M. Mostafa and Norimi Mizutani</i>	823
Distorted Flow Field and Induced Sand Drift Around Flexible, Artificial Seaweed <i>Makoto Ifuku, Norihiko Sakata and Hidero Hayashi</i>	831
Modeling Horizontally Two Dimensional Wave-Current Coexistence Field Over Uneven Topography <i>Md. Hasanat Zaman and Hiroyoshi Togashi</i>	838
A Numerical Method for Solving Second Order Diffraction Problem by Using Green's Identity Formula <i>Keisuke Murakami, A. Yoshida and I. Irie</i>	846
Small-Scale Beach Contour Modelling Behind a Submerged Plate <i>J. Lengricht, A. Schlenkhoff and C. Fischer</i>	854
Failure Mode Response Functions in Reliability-Based Design of Rubble-Mound Breakwaters <i>Aysen Ergin and Can Elmar Balas</i>	861
Wave Blocking Efficiency of Flexible Membrane Breakwaters in Oblique Seas <i>S.T. Kee, I.H. Cho and M.H. Kim</i>	869
Formation of River-Mouth Bar by Waves and Wave-Induced Current <i>Ichiro Deguchi and Su Kyeong Chun</i>	877
Beach Response to Sea-Level Rise Around the Sea of Japan (East Sea) <i>Chang Bae Son, Hideaki Noda, Yuhei Matsubara and Masamitsu Kuroiwa</i>	885

Effects of a Submerged Structure on the Tidal Current <i>S.Y. Boo and K. Hong</i>	891
A Numerical Simulation of Vertical Convection Flow Induced by V-Shaped Plate <i>Chan-Kyu Yang, Keyyong Hong and Hark-Sun Choi</i>	899
Wave Interactions with an Infinite Array of 3-D Bodies <i>Takayuki Nakamura</i>	906
In Situ Detection of the Settling Velocity of Suspended Particles by Means of Underwater Videomicroscope <i>Verena Baier and W. Bechteler</i>	913
Measurement of Sand Beach Profiles in the Large Wave Flume <i>W. Dursthoff, O. Berend, R. Schmidt-Kopenhagen and W. Dursthoff</i>	917
Development of a Laser-Doppler-System for Measuring the Velocity Field Around a Cylinder Placed Close to the Bottom of a Wave Channel <i>W. Dursthoff and D. Mouazé</i>	924
Water Particle Velocity Field and Embedment of Artificial Fish Reef Under Wave Action <i>June-Q Kim, Koichiro Iwata, Norimi Mizutani, Atsushi Suzuki and Teofilo Monge Ruffin, Jr.</i>	929
Nonlinear Wave Effects on Wave Measurements at Different Depths <i>Igor Prislín and Jun Zhang</i>	937
Experimental Study on the Estimation Methods of Wave Orbital Velocity <i>Leonardo Damiani and Michele Mossa</i>	942
Numerical Model for Solving Boussinesq-Type Equations: Comparisons and Validation <i>Zhili Zou and Benhe Xui</i>	950
ADDITIONAL PAPERS	
Simulation of Transient Bichromatic Second-Order Stokes Waves in a Two-Dimensional Wavetank <i>S. Zhang and A.N. Williams</i>	955
Vortex-Excited Vibration of a Vertical Circular Cylinder in Waves <i>Kenjiro Hayashi and John R. Chaplin</i>	963

The Proceedings of The Seventh (1997) International OFFSHORE AND POLAR ENGINEERING CONFERENCE

Honolulu, Hawaii, USA, May 25-30, 1997

VOLUME IV, 1997

**Tubular Structures, Welding and Robotics, Fatigue and Fracture, Steel, Corrosion and NDT,
Composite Materials, Mechanics and Structures, Reliability, Risk and Safety,
Collision/Impact/Damage, Marine and Underwater Systems,
Earthquake Engineering**

How to Use This Table of Contents

Scroll down or use the bookmarks in the left-side frame to move to a new location in this index. Click on a **blue paper title** you like to view.

To return to this index after viewing a paper, click on PREVIOUS MENU bookmark in the left-side frame.

This CD-ROM is created from the PDF files. The hard-copy originals in the proceedings are scanned and saved as PDF files. View quality of the text and graphics, the searchability and the ease of readability depend largely on the quality and/or consistency of the originals.

Copyright © 1997 by International Society of Offshore and Polar Engineers,
Golden, Colorado, USA. All Rights Reserved.

www.isopec.org: orders@isopec.org

International Standard Book Number: ISBN 1-880653-28-1 (Set)

Library of Congress Catalog Card Number: 97-70292

Indexed by Engineering Index, Compendex and Others

www.isopec.org: orders@isopec.org

edited by:

Ram S. Puthli, Universitat Karlsruhe, Karlsruhe, GERMANY

Yasuo Suga, Keio University, Yokohama, Japan

Nick Patrikalakis, Massachusetts Institute of Technology, Cambridge, USA

presented at:

The Seventh (1997) International Offshore and Polar Engineering Conference held in Honolulu, USA, May 25-30, 1997

organized by:

International Society of Offshore and Polar Engineers

sponsored by:

International Society of Offshore and Polar Engineers (ISOPE)
with cooperating societies and associations

The publisher and the editors of its publications assume no responsibility for the statements or opinions expressed in papers or presentations by the contributors to this conference or proceedings.

International Society of Offshore and Polar Engineers (ISOPE)
P.O. Box 189, Cupertino, California 95015-0189 USA

CONTENTS

PLENARY PRESENTATION

Current Trends in the Safety of Offshore Structures

T. Moan..... 1

TUBULAR STRUCTURES

A New Ultimate Capacity Formula for Unstiffened CHS T-, TT- and K-Joints Under Axial Brace Loads

M. Morita, Y. Yamada, Y. Makino, S.R. Wilmshurst, Y. Kurobane and M.M.K. Lee..... 13

Behaviour of Innovative Tubular KT-Joints Under Variable Repeated Loading

Nick K. Milani and Paul Grundy..... 21

Failure Assessment Diagram Method for Tubular Joints

Björn Klasén and Stig Wästberg..... 29

Mechanical Properties of Friction Welded Joints of AZ31 Magnesium Alloy

Kazuyoshi Katoh, Toshikatsu Asahina and Hiroshi Tokisue..... 37

The Static Strength of Stiffened and Unstiffened L-Joints Made of Circular Hollow Sections

R. Puthli, F. Mang and D. Karcher..... 44

Additional Tests of CHS Planar KK-Joints Under Anti-Symmetrical Axial Loads <i>Y. Makino, S.R. Wilmshurst, Y. Kurobane and A. Yoshida</i>	51
Further Numerical Analyses of KK-Joints Under Anti-Symmetrical Axial Loading <i>S.R. Wilmshurst, Y. Makino and Y. Kurobane</i>	58
The Axial Strength of Uniplanar X-Joints Reinforced by T-Shaped Ring-Stiffeners <i>G.J. van der Vegte, D.H. Leray and Y.S. Choo</i>	65
The Static Behaviour of Bolted I-Beam to RHS Column Connections with a Composite Floor <i>L.H. Lu and J. Wardenier</i>	70
Characteristics of Bending Strength and Residual Stress Distribution on High Thermal Cycle of Ceramic/Metal Joint <i>Young-Chul Park, Sun-Chul Huh, Hoo-Taek Koo and Kwang-Young Kim</i>	78
Multiaxial Fatigue in Offshore Tubular Joints <i>Andras Abel and Xiao-bo Yu</i>	85
Effects of Joint Flexibility on the Fatigue Design of Welded Tubular Lattice Structures <i>A. Romeijn, S.A. Karamanos and J. Wardenier</i>	90
FE Mesh Generation for Circular Tubular Joints with or without Cracks <i>Junjie Cao, Guojing Yang and Jeffrey A. Packer</i>	98
Numerical SCF-Analyses of Grouted Tubular T- and X-Joints <i>G. Partiman, J. Wardenier, A. Romeijn and R.J. van Foeken</i>	106
Large Scale Testing of a Multiplanar Tubular DX-Joint <i>S.P. Chiew, C.K. Soh and T.C. Fung</i>	112
Tubular Joints Reliability and Fracture Analyses for Development of Underwater Inspection of Offshore Steel Structures <i>Wan Mahmood Wan Ab. Majid and Mohamad bin Embong</i>	119
A Modified CEBG Assessment Approach to Flawed Tubular Joints <i>Bo Wang, Yoshiaki Kurobane and Yuji Makino</i>	125
Damage Criterion and Ultimate Strength for Tubular Joints <i>Bo Wang, Yoshiaki Kurobane and Yuji Makino</i>	132
RELIABILITY, RISK AND SAFETY	
Sensitivity of TLP Tendon Reliability Estimates to Excitation by Multi-Peaked Random Seas <i>J.W. van de Lindt and J.M. Niedzwecki</i>	139
Fatigue and Overload Reliability of Mooring Systems <i>Geir Olav Hovde and Torgeir Moan</i>	145
Risk Analysis of the Vertical Offshore Breakwater at Gela, Italy <i>G. Passoni, A. Rigoni and L. Franco</i>	153

Probabilistic Calibrated Design Equation for Burst Strength Assessment of Corroded Pipes <i>O.H. Bjørnøy, E.H. Cramer and G. Sigurdsson</i>	160
An Application of Design of Experiments Concepts to the Inspection Planning of Structures <i>Alexandre Kawano</i>	167
Using Structural Reliability Analysis in Inspection Planning of Offshore Structures <i>Luis Volnei Sudati Sagrilo, Edison Castro Prates de Lima, Carlos Cunha Dias Henriques and Sérgio Guillermo Hormazabal Rodriguez</i>	174
Sensitivity Analysis on Fatigue Reliability and Inspection of Ship Structural Members <i>Yukio Fujimoto, Sung Chan Kim and Eiji Shintaku</i>	179
Use of Structural Simulation for Extension of Life of Offshore Structures <i>A.C. Walker, C.P. Ellinas and W. Snedden</i>	187
Reliability-Based Design and Requalification Criteria for Longitudinally Corroded Pipelines <i>Yong Bai, Tao Xu and Robert Bea</i>	193
Reassessment and Requalification of Two Gulf of Mexico Platforms <i>A. Sturm, R. Bea and T. Miller</i>	202
Substructural Identification of Offshore Structures Using Neural Networks <i>Chung-Bang Yun and Eun Young Bahng</i>	210
A Strategic Approach to Risk Reduction <i>Robert J. Simpson and Donald Smith</i>	216
Jet Fire Resistance for Passive Fire Protection Materials on Tubular Sections <i>Tariq Al-Hassan, Alex B. Wenzel and Paul Mather</i>	220
Effect of Boundary Conditions on Performance of Corrugated Panels to Blast Loading <i>L.A. Louca, Y.G. Pan and G. White</i>	226
Probabilistic Finite Element Methodology for the Reliability Assessment of Stiffened Plates <i>I.R. (Wally) Orisamolu and K-T. Ma</i>	232
Probabilistic Characterization of Pitting Corrosion Damage in Steel Panels <i>K-T Ma and I.R. (Wally) Orisamolu</i>	239
Integrity Up-Diving Down <i>M. Visser</i>	246
Risk-Based Decision Analysis for the Protection of Marine Pipelines from Dropped Objects <i>S. Yasseri</i>	251
The Relationship Between Public Policy and Risk Assessment in Tanker Design Regulation <i>Henry S. Marcus and Alan J. Brown</i>	257
Total Loss Risk of Ship Accidents <i>Wayne K. Talley</i>	262

Probabilistic Analysis of the Effect of Resource Constraints on System Safety: Towing Failures During the Construction of Concrete Platforms <i>Elisabeth Paté-Cornell and Wenche Rettedal</i>	268
Risk of Collisions and Groundings in Bulk Carriers and Tankers <i>Alexander M. Goulielmos, Kostas Giziakis and Ernestini Giziaki</i>	275
Toward a Port-Level Model of the Physical Risk of Grounding <i>Hauke L. Kite-Powell, Di Jin, Johan Jebsen, Vassilis Papakonstantinou and Nicholas Patrikalakis</i>	283
Admittance Policy Deep Draught Vessels and Safety <i>R.Ph.A.C. Savenije</i>	289
Houston/Galveston Safe Passage into the 21st Century, 1996 <i>Stephen F. Ford and Ronald J. Bald</i>	297
Third Generation Electronic Charts: What They Will Provide Users and How to Produce Them <i>Peter Kielland and Michel Dagbert</i>	305
A Probabilistic Analysis of Tanker Groundings <i>Michael D. Amrozowicz, Alan Brown and Michael Golay</i>	313
MECHANICS AND STRUCTURES	
Experimental Validation of the Ultimate Limit State Limit Equilibrium Analysis (ULSLEA) with Results from Frame Tests <i>M. Mortazavi and R.G. Bea</i>	321
An Empirical Formulation for Predicting the Ultimate Compressive Strength of Stiffened Panels <i>Jeom K. Paik and Anil K. Thayamballi</i>	328
A Posteriori Error Estimation and Improvement of Solution for Frame Structure Eigenvalue Problems <i>Mitsuru Kitamura, YuHua Chen and Hisashi Nobukawa</i>	339
Testing Ras Tanura Sea Island Breasting Dolphins <i>Abobakr M. Radwan and Ala A. Al-Sharif</i>	347
Buckling/Plastic Collapse Behaviour and Strength of Stiffened Plates Under Thrust <i>Tetsuya Yao, Masahiko Fujikubo and Daisuke Yanagihara</i>	353
Buckling Strength Analysis of Ring-Stiffened Circular Cylindrical Shells Under Hydrostatic Pressure <i>Hai-Hong Sun and Tie-Yun Chen</i>	361
The Governfactor of Plastic Spin <i>Y.Y. Nam and S.G. Lee</i>	367
Development of the Buckling Strength Estimation System for Plate Members Considering Tensile Load Effects <i>Juh Hyeok Ham and Ul Nyeon Kim</i>	373

Buckling and Ultimate Strength of Plates Subjected to Combined Loads <i>Masahiko Fujikubo, Tetsuya Yao and Balu Varghese</i>	380
A Boundary Element Based Solution of an Inverse Elasticity Problem by Conjugate Gradient and Regularization Method <i>Cheng-Hung Huang and Wu-Yang Shih</i>	388
COLLISION, IMPACT AND DAMAGE	
On Collision Strength of Ship's Bow <i>Jeom Kee Paik and Jang Young Chung</i>	396
Experimental Study on Impact Force by Small Ship Collision to Fender System of Bridge <i>S. Shiraishi and R. Naitoh</i>	403
Assessment of Grounding Resistance of Oil Tankers <i>Sung Kyou Choi, Jae Hyung Park and Tomasz Wierzbicki</i>	410
A Study on the Critical Collision Speed of Double Hull VLCC <i>Sang-Gab Lee and Young-Gu Chung</i>	416
Impact Loading of Plates: Validation of Numerical Simulations by Testing <i>Magnus Langseth, Odd Sture Hopperstad and Torodd Berstad</i>	424
Side Collision Resistance of Ship's Stiffened Panels <i>Sang-Rai Cho, Sang-Bock Lee and Il-Woong Kim</i>	431
Integrity Monitoring of Offshore Platforms Using Artificial Neural Nets <i>Pradipta Banerji and Tushar K. Datta</i>	439
EARTHQUAKE ENGINEERING	
Three-Dimensional Characteristics of Seaquakes <i>T. Kiyokawa</i>	445
Analytical Solution for the Earthquake Response of a Cylindrical Structure Considering Hydrodynamic and Soil Dynamic Interaction <i>Yoshihiro Tanaka, Takaaki Nakamura and Kyohei Ito</i>	451
Dynamic Behavior of Large Tension Leg Floating Structures for Horizontally Traveling Seismic Waves <i>Takuji Hamamoto, Masashi Inoue and Yasuo Tanaka</i>	458
Seismic Response of TLP Under Offset Condition <i>Katta Venkataramana, Kenji Kawano and Susumu Yoshihara</i>	466
Seismic Behavior of Steel Piles in Offshore Bridge Piers <i>A. Astaneh-Asl and S. Ravat</i>	472

A Theoretical Study on the Effect of Seaquakes on a Two-Dimensional Floating Body <i>Yasushi Higo</i>	480
Dynamic Response Analysis of Semi Float Type Offshore Platform <i>Kenji Kawano, Katta Venkataramana, Tutomu Hashimoto and Tomoyo Taniguchi</i>	485
UNDERWATER WELDING	
Deepwater Hyperbaric Welding - Initial Process Evaluation <i>Ian M. Richardson and John H. Nixon</i>	493
Monitoring of Molten Pool and Adaptive Control of Penetration in GTAW of Thin Mild Steel Plates <i>Y. Suga, M. Mukai, S. Usui and K. Ogawa</i>	502
Consideration of Sensing Methods for Mechanized Underwater Wet Welding <i>M. Tanaka, T. Morita, N. Kitamura, K. Tohno, T. Irie, H. Matsushita, Y. Ogawa and T. Sumitomo</i>	508
Automation of Arc Welding for Large Scale Structures by a Visual Sensor <i>A. Ishii, N. Masaoka, T. Tsushima and Y. Ochi</i>	515
Gas Removal and Separation for Underwater-Welding Applications with Shielding Gas Recycling <i>M. Creutz and D. Mewes</i>	521
Intelligent Image Processing for Abstraction and Discrimination of Defect Image in Radiographic Film <i>Kimiya Aoki and Yasuo Suga</i>	527
The Influence of the Main Factors on the Impact Toughness Properties of Low Carbon Steel Welds <i>T. Wegrzyn</i>	532
Development of Real-Time Quality Evaluation of Friction Welding by Acoustic Emission: 3rd Report. Effects of Initial AE Counts During Plastic Deformation in FRW <i>Sae-Kyoo Oh, Hyung-Dong Park, Bae-Sub Lee and Hong-Keun Chang</i>	535
Friction Welding of Aluminum Alloy and Steel <i>H. Ochi, K. Ogawa, Y. Yamamoto and Y. Suga</i>	541
Friction Welding of 6061 Aluminum Alloy Pipe to S25C Carbon Steel Pipe <i>G. Kawai, K. Ogawa and H. Tokisue</i>	546
STEEL, CORROSION AND NDT	
The New Eurocode 3 - Part 2 - Annex C: Approach for the Choice of Steel Material to Avoid Brittle Fracture <i>Natalie Stranghöner, Gerhard Sedlacek, Gero Stötzl, Winfried Dahl and Peter Langenberg</i>	551
Study on Hot Spot Stress for Fatigue Strength Assessment of Fillet Welded Structure <i>Kanta Nihei, Fumihide Inamura and Shigeki Koe</i>	557

Effects of Static Load on Fatigue Strength of Ship Structure <i>W.S. Kim, Y. Tomita, K. Hashimoto and N. Osawa</i>	565
Restored Fatigue Life with Repair Welds <i>Barbara A. Kelly and Robert J. Dexter</i>	572
Definition of Physical Wear-and-Tear of the Marine Transport Hydraulic Structures <i>Vladimir L. Menshikov</i>	578
Recent Improvements in Automated Inspection and Fabrication Technology for Pipelines and Risers in Deep Water <i>J.C. Price</i>	583
Development of Long-Time Creep Safety Life Prediction of Steam Turbine Rotor Steel and AE Evaluation <i>Sae-Kyoo Oh, Hong-Keun Chang, Min-Hwa Chung and Sang-Guk Lee</i>	589
Some Aspects of Aging in a Low Carbon Bainitic Steel Containing Copper <i>G.J. Kulkarni and D.K. Biswas</i>	596
Nucleation of Proeutectoid Ferrite at Manganese-Sulphide Inclusion Sites in HY-80 Steel <i>D.K. Biswas and G.J. Kulkarni</i>	600
Fatigue Strength of Partially Thermal Sprayed Materials Under Corrosive Environment <i>H. Yara, T. Makishi, H. Arasaki and A. Ikuta</i>	602
Coalescence Conditions for Stress-Corrosion Cracking Based on Interacting Crack Pairs <i>B.N. Leis and R. Mohan</i>	607
Corrosion Behavior of Thermal Sprayed Metals on Weld of Galvanized Steel <i>Young-Gak Kweon and Jai-Hyun Park</i>	614
Prevention of Preferential Corrosion of Welded Joints of Carbon Steel in CO₂ Containing Environment <i>Shigeru Endo, Sakae Fujita, Moriyasu Nagae and Mitsumasa Iwata</i>	618
An Alternative Approach to Assess the Integrity of Corroded Line Pipe - Part I: Current Status <i>B.N. Leis and D.R. Stephens</i>	624
An Alternative Approach to Assess the Integrity of Corroded Line Pipe - Part II: Alternative Criterion <i>B.N. Leis and D.R. Stephens</i>	635
COMPOSITE MATERIALS	
Transverse Fatigue Crack Growth in a Graphite/Epoxy Composite Subjected to Combined Hydrostatic and Axial Loading <i>S.T. Mear, H.G. Wheat and H.L. Marcus</i>	642
Proposition of Polyhedrally-Stiffened Shells for Undersea Pressure Hulls <i>R.H. Knapp and T.T. Le</i>	650

Construction Applications of Fiber Reinforced Polymer Composites: A Survey	
<i>T. Kant, V.P.V. Ramana, P.K. Dutta, A. Mukherjee and Y. Desai</i>	657
Study of FEM Simulation of Cyclic Plastic Behavior of Face-Centered Crystal (f.c.c.) Polycrystalline Materials	
<i>Yasumitsu Tomita, Kiyoshi Hashimoto, Naoki Osawa and Taira Ozaki</i>	664
A Micromechanical Study of the Freeze-Thaw Behavior of Polymer Composites	
<i>Piyush K. Dutta</i>	672
MARINE AND UNDERWATER SYSTEMS	
Design of Fast Ships for Minimal Motions	
<i>Alexander H. Day and Lawrence J. Doctors</i>	677
On Efficient Design of Swath Ships by Using Reliability-Based Optimisation	
<i>Yongchang Pu</i>	684
Comparison of Structural Analysis Methods for Swath Ship Design	
<i>L.H. Seidl, K.F. Cheung and S. Wang</i>	689
An Experimental Study on the Structural Behavior and Vibrational Characteristics of Sandwich Plate with Aluminium Honeycomb Core	
<i>C.Y. Son, I.T. Kim and J.S. Paik</i>	697
Numerical Study on 3-Dimensional Power-Augmented Ram Wing in Ground Effect	
<i>Seung-Hyun Kwag</i>	704
The Dynamic Behaviour of a Fast Sailing Monohull in Waves	
<i>F. Louarn, W.G. Price and P. Temarel</i>	712
Prediction of Hydrodynamic Forces on High Speed Vessels	
<i>Mikio Takaki and Xin Lin</i>	721
Prediction of the Effects of Control Surfaces on the Motion of a Catamaran	
<i>Woo-Joon Yoo, Jae-Hong Park, Tae-Young Lee and Il-Geun Oh</i>	729
Seakeeping Analysis of a 30-Knot Coastal Passenger Swath Ship	
<i>H.H. Chun, M.S. Kim and Y.R. Joo</i>	736
Development of a New Integrated System of Ship Structure Analysis	
<i>O. Niho, K. Nishimura, T. Tsubokawa, H. Kaminaga, T. Maeda and K. Shimada</i>	746
The Influence of a Ship's Rudder on the Scouring Action of a Propeller Wash	
<i>G.A. Hamill and J.A. McGarvey</i>	754
A Finite-Volume Method for Three Dimensional Viscous Flow Around Ship Stern	
<i>Tieli Li, Yan Lin and Yanying Wang</i>	758
Ship Form Description with Function Parameter	
<i>Yan Lin, Zhaohui Zhu, Zhuoshang Ji and Yinsheng Dai</i>	761

A CFD Model of a Marine Propeller Wash <i>P.B. Brewster, G.A. Hamill, S. Raghunathan, D.J. Robinson and H.T. Johnston</i>	763
Navy Total Asset Visibility: A System Component Review <i>Robert F. Paguio and Ramon Flores</i>	768
Developing and Testing a Rough-Water Flexible Connector System for Pontoon Barges <i>William G. Hatch, Erick T. Huang and Joseph L. Barthelemy</i>	773
Rapid Steel Pile Cutting Technology <i>Sheng S. Lin</i>	780
Design of an Expeditionary Port Facility <i>Michele A. Murdoch and Glenwood Bretz</i>	784
Buckling Strength of Lightened Aluminium Hull Structures <i>Yoshiteru Tanaka and Kazuyoshi Matsuoka</i>	790
A Study on the Characteristics of BTA Deep Hole Drilling for Marine Part Materials <i>Sung-Bo Sim and Tae-Ok Jun</i>	798
ADDITIONAL PAPERS	
Recent Developments in Evaluating and Designing Against Offshore Fire and Explosion <i>G.A. Chamberlain</i>	807
Risk Based Decisions for Entrance Channel Operation and Design <i>Andrew L. Silver and John F. Dalzell</i>	815
ISOPE-97 Proc. Vol. 1-4 97.3.30	