

PROCEEDINGS

29TH INTERNATIONAL WORKSHOP ON WATER WAVES & FLOATING BODIES

The 29th

— *IWWWFB in Osaka, Japan*
International Workshop on Water Waves and Floating Bodies



EDITORS:
MASASHI KASHIWAGI, MUNEHICO MINOURA

MARCH 30 – APRIL 2, 2014
SUITA, OSAKA, JAPAN

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HOTEL HANKYU EXPO PARK
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Naniwa-Maru (Restored Higaki-Kaisen)

During the Edo era (1603 - 1868), a large amount of various goods had been transported from Osaka to Edo (present Tokyo) by sail ships, among which a competent and famous one was called Higaki Kaisen (Higaki is a diamond-shaped lattice decorated on the ship's side above the water line). In the 17th century, the size of ships was not large but it gradually increased and culminated in the 19th century as authentic business sail ships, original in Japan.

Osaka City had built Naniwa-Maru (Naniwa is the old name of Osaka) in 1999 as restoration of a real-size Higaki Kaisen and displayed it in the Osaka Marine Museum. For three weeks just before installation in the Museum, the real-sea operation of Naniwa-Maru had been conducted to see its performance and to measure various data as a real-sea experiment by the research group led by the late Professor Emeritus Kensaku Nomoto of Osaka University.



Organization:

The 29th International Workshop on Water Waves and Floating Bodies (IWWWFB) was organized by

Laboratory of Seakeeping & Floating-Body Dynamics in Waves,
Department of Naval Architecture & Ocean Engineering,
Graduate School of Engineering, Osaka University.

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PREFACE

The International Workshop on Water Waves and Floating Bodies is an annual meeting of engineers and scientists with a particular interest in water waves and their effects on floating and submerged marine structures. The IWWWFB was initiated by Professor D. V. Evans (University of Bristol) and Professor J. N. Newman (MIT) following informal meetings between their research groups in 1984. First intended to promote communications between researchers in the UK and the USA, the interest and participation quickly spread to include researchers from many other countries around the world. The Workshop places particular emphasis on the participation of younger researchers, on the stimulation of discussions between engineers and scientists, and to the presentation of preliminary basic scientific work before its publication elsewhere. The Workshop is an important reference point for organizing and spreading knowledge in this area. In particular, the Workshop proceedings are freely accessible through the dedicated internet address www.iwwwfb.org where all contributions from 1986 on can be found.

Since its inception, the Workshop has seen a robust growth in attendance and now annually brings together around eighty marine hydrodynamicists, naval architects, offshore and arctic engineers, and other scientists and mathematicians from around the world.

Although the style of research and the generation of participants are gradually changing with the times, the fundamental principle in the Workshop has been the same essentially from its inception. That is, (1) the topic should be related to water waves and their effects on floating and submerged bodies. These days, however, abstracts in adjacent fields of speciality may be accepted, provided that they are sufficiently broad or profound to be of interest to this specific field. (2) Abstracts should be of high quality in that new ideas are included in the analytical and/or numerical work. Purely experimental work must emphasize underlying physics. As far as these are satisfied, even incomplete and on-going work can be accepted. (3) The program will be in the single session, implying that the maximum number of abstracts to be accepted is about 50 or a little more at most, and sufficient time for the discussion should be provided not only just after each presentation but also even after the session (during coffee break, lunch, dinner). (4) Attendance is restricted to the authors who submitted extended four-page abstracts. (Exceptions may exist for the past hosts, session chairpersons, and sponsors.) The abstracts at the Workshop have been selected with stringent review by a small committee. All of the accepted abstracts for this year's Workshop are collected in these proceedings, and the abstracts along with recorded discussions are available on the Workshop web site.

A NOTE FROM THE ORGANIZERS

We are very pleased to welcome the participants of the 29th International Workshop on Water Waves and Floating Bodies to Osaka, Japan. The IWWWFB was held twice in Japan in the past (the 9th in Kyushu hosted by Professor Makoto Ohkusu and the 16th in Hiroshima hosted by Professor Kazuhiro Mori) and the 29th Workshop in Osaka is the third one organized in Japan.

As you may know, Japan is surrounded by ocean and thus the research associated with ocean science, naval architecture, and ocean engineering has been and will be of vital importance for Japan. We believe that Japan has been one of the leading countries in our community, contributing to the theoretical, numerical and experimental work on water waves and floating bodies, and we aim to keep this tradition in the future as well.

This year we received a sufficient large number of abstracts from 18 countries, out of which 55 have been accepted for presentation after stringent review and are included in these proceedings. The contributions cover a wide range of topics such as the wave-body interactions, marine-energy utilization, violent flows, ship waves and associated resistance, fluid-structure interactions and so on, while the authors cover all career stages from young PhD students to the most senior and distinguished researchers. This is the 5th year since the establishment of the Tuck Fellowship which, in memory of Professor Ernie Tuck, supports the participation of one student or younger researcher each year. This year we received eight applications and the prize was awarded to Ms. Malin Göteman, a post-doc at the Uppsala University in Sweden.

The 29th IWWWFB is dedicated to the memories of the late Professor Emeritus Makoto Ohkusu of RIAM (Research Institute for Applied Mechanics), Kyushu University, Japan. He was an eager participant to the Workshop, organized the 9th Workshop, and as introduced next he did great contributions in the ship and ocean-structure hydrodynamics.

This year's Workshop is held from March 30 through April 2; this period was selected to provide the participants especially from overseas countries with a chance to see the full bloom of beautiful cherry blossoms in Japan. (We wish this expectation will be realized.)

Through a good combination of the outstanding quality of the accepted abstracts, the vernal freshness of pink-color cherry blossoms, and our efforts to organize a memorial and smooth event, we sincerely wish that you all will have a stimulating meeting and a pleasant stay in Osaka!

With best wishes,

Masashi Kashiwagi & Munehiko Minoura



MAKOTO OHKUSU (1937-2006)

By Masashi Kashiwagi

Makoto Ohkusu was born in 1937 and educated at the Department of Naval Architecture at the University of Tokyo. His scientific career started working on the steady wave-making resistance of a ship, as a student of the late Professor Emeritus Takao Inui. After finishing the graduate master course, he worked for Mitsui Shipbuilding Co., Ltd. for three and half years. Then he was employed as Lecturer at Research Institute for Applied Mechanics (RIAM), Kyushu University in 1967, and he started working on wave-body interaction and seakeeping problems in association with the late Professor Fukuzo Tasai. He was promoted to Associate Professor in 1973 and then to Professor in 1981. Up to his retirement in 2001, he had been involved in research and education at Kyushu University for 34 years. After the retirement from Kyushu University, he had contributed further to the research and nurturing young researchers as Visiting Professor of Helsinki Technical University in Finland, the technical advisor of Mitsui Akishima Laboratories Inc., and the dean of Ocean-Engineering Center at Japan Agency for Marine-Earth Science & Technology (JAMSTEC).

The first work which made him internationally famous was on the hydrodynamic interactions among multiple floating bodies both in 2D and 3D problems. This work has drawn much attention from engineers and scientists and greatly contributed to the development of multiple-hull ships like catamaran and offshore platforms. This wave interaction theory is well acknowledged as Ohkusu's theory which is being used even in some recent papers in the Workshop. Another outstanding contribution by him in ship hydrodynamics is the development of the unsteady wave-pattern analysis method. This provided a new technique for studying the hydrodynamic forces on and motions of a ship running at forward speed in waves, and shed new light on the study of the added resistance and resulting speed loss. Recently I have used his theory of unsteady wave analysis for the study on the added resistance, and recognized its usefulness in understanding the principle of energy conservation and the degree of contribution from the wave making component in the added resistance.

He also had published many other noteworthy papers, concerning such topics as the nonlinear behavior of a long flexible cable, a new calculation method for the oscillating and translating Green function with steepest descent method in the complex plane, and its application to the boundary-value problem for the unsteady flow around ships. During the last several years at Kyushu University, he showed great interest in the hydroelastic problems connected with very large floating structures to be used as floating airports and published some archival papers on that topic. His paper of an analytical study on this hydroelastic problem continues to attract interest, which is illustrated in the paper by Prof. Aad Hermans to be presented at this year's Workshop.

Makoto Ohkusu had been a leader in ship hydrodynamics, especially in the field of seakeeping, in Japan and also in the world. He had been active internationally with good command of English, and he served as a member and also chairman of the seakeeping committee of International Towing Tank Conferences (ITTC). More proudly, he was designated as the 27th George Weinblum Lecturer (2004-2005) and he also received several outstanding awards from the Japan Society of Naval Architects and Ocean Engineers.

When I was 30 years old, just two years after finishing my PhD course at Osaka University, Professor Ohkusu kindly invited me to RIAM, Kyushu University, as Associate Professor, although my academic achievement at that time was so little. Because I knew famous names of Professors Tasai and Ohkusu and RIAM was highly recognized as a leading institute especially in the seakeeping field, first I hesitated to accept his invitation. However, his eager invitation with hand-written letters and drinking together immediately made me decide to start working seriously on seakeeping problems at RIAM, Kyushu University. Recalling the past memories, I am now confident that moving to RIAM, Kyushu University was a correct decision in my life and I could have wonderful academic career thanks to Professor Ohkusu's bold decision of inviting me as Associate Professor and thoughtful consideration afterwards.

Due to his international way of thinking, friendly personality and highly evaluated academic achievement, many famous scholars in the community of this IWWWFB visited and stayed at RIAM as visiting professors, such as J. N. Newman, O. M. Faltinsen, R. Eatock Taylor, R. W. Yeung, A. A. Korobkin, T. Miloh and others. Through these invitations, Professor Ohkusu had built strong personal connection with international friends. Fortunately every time they visited RIAM, I could have opportunities of talking and socializing with them, which could be invaluable experiences in building up my perspective in order to be internationally active.

He organized some international conferences including the 9th IWWWFB and the 2nd Hydroelasticity Conference, which had shown me good examples of how important the international relationships are, and involvement in organizing those conferences could be very good experiences for me to learn how international conferences should be hosted. This Workshop is the 29th one and hence 20 years have passed after his organizing the Workshop in Kyushu. He passed away on 12 May 2006 at the age of 68, and he surely wanted to live longer and wanted to participate in the Workshop much more times including this year's Workshop. I believe that in return he is supporting me in the background for this Workshop from the heaven, and I am pleased this Workshop can be dedicated to the memories of Makoto Ohkusu.

29th International Workshop on Water Waves and Floating Bodies Suita, Osaka: March 30 – April 2, 2014

Technical Program

SUNDAY, MARCH 30, 2014

09:00 – 12:00	Registration Free Tour to EXPO Park with prepared ticket	
12:00 – 13:15	Lunch	
13:20 – 13:35	Welcome – Opening Remarks	Masashi Kashiwagi
Session 1	CHAIR: J.N. NEWMAN	
13:35 – 14:00	A Semi-analytic Formulation for the Hydrodynamic Diffraction by Submerged Ellipsoids	Chatjigeorgiou I.K., Dassios G., Mavrakos S.A., Miloh T.
14:00 – 14:25	Wave Trapping and Radiation by Semi-immersed Circular Cylinders	Chaplin J.R., Porter R.
14:25 – 14:50	Transparency of Structures in Water Waves	Evans D.V., McIver M., Porter R.
14:50 – 15:15	Hypersingular Integral-Equation Method for Wave Diffraction about Arbitrary, Shell-Like Vertical Cylinders in Finite-Depth Waters	Hariri Nokob M., Yeung R.W.
15:15 – 15:30	Coffee Break	
Session 2	CHAIR: R. EATOCK TAYLOR	
15:30 – 15:55	Second Order Wave Loads Based on Second Order TEBEM	Duan W., Chen J., Zhao B.
15:55 – 16:20	A Novel Approach of QTFs for Floating Body	Teng B., Cong P.
16:20 – 16:45	Hydroelastic Behavior of a Vertical Plate Subjected to Third-order Wave Interactions	Katifeoglou S.A., Molin B., Chatjigeorgiou I.K.
16:45 – 17:10	Nonlinear Simulation of Wave Resonances in a Narrow Gap between Two Barges	Feng X., Bai W., Ang K.K.
17:10 – 17:25	Coffee Break	
Session 3	CHAIR: R.F. BECK	
17:25 – 17:50	The Application of Velocity Decomposition to Fully-Submerged Free-Surface Problems	Rosemurgy W.J., Maki K.J., Beck R.F.
17:50 – 18:15	Interference Effects on Farfield Ship Waves at High Froude Numbers	Noblesse F., Zhu R., Hong L., Zhang C., He J., Zhu Y.
18:15 – 18:40	On the Interfacial Viscous Ship Waves Pattern	Dai Y.Z.
18:40 – 19:05	Towards Real Time Simulation of Ship-Ship Interaction -Part III: Immersed Body Boundary Condition and Double Body Ship-Ship Interaction -	Lindberg O., Bingham H.B., Engsig-Karup A.P.
19:30 – 20:00	Welcome Party	
20:00 – 21:30	Dinner	

MONDAY, MARCH 31, 2014

Session 4	CHAIR: O.M. FALTINSEN	
08:15 – 08:40	Impact of Liquids of Different Densities	Semenov Y.A., Wu G.X., Korobkin A.A.
08:40 – 09:05	Water-exit Problem with Prescribed Motion of a Symmetric Body	Korobkin A.A., Khabakhpasheva T. I., Maki K.J.
09:05 – 09:30	Study on Slamming and Whipping Response of Ship Structure	Kim J.H., Kim Y., Korobkin A.A., Lee D.Y.
09:30 – 09:55	Numerical and Experimental Study of the Wave Response of a Floating Support with Partially Filled Tank	Su Y., Kimmoun O., Molin B.
09:55 – 10:15	Coffee Break	
Session 5	CHAIR: Y. KIM	
10:15 – 10:40	Highly Nonlinear Wave in Tank with Small Density Ratio	Scolan Y.M., Karimi M.R., Dias F., Ghidaglia J.M., Costes J.
10:40 – 11:05	Global and Local Effects of Gas-Liquid Density Ratio on Shape and Kinematics of Sloshing Waves and Scaling Considerations	Karimi M.R., Brosset L.
11:05 – 11:30	Recent Progress on the GN Model for a Two-layer Flow	Zhao B.B., Duan W.Y., Ertekin R.C. Webster W.C.
11:30 – 11:55	Hydroelastic Response of a Submerged Structure to an Underwater Explosion	Colicchio G., Greco M., Faltinsen O.M.
12:15 – 13:15	Lunch	
Session 6	CHAIR: A.A. KOROBKIN	
13:30 – 13:55	Modified Shallow Water Equations for Mild-slope Seabeds	Dutykh D., Clamond D.
13:55 – 14:20	Development of a Highly Nonlinear Model for Wave Propagation over a Variable Bathymetry	Gouin M., Ducrozet G., Ferrant P.
14:20 – 14:45	A New Set of Focused Wave Linear Combinations to Extract Non-linear Wave Harmonics	Hann M., Greaves D., Raby A.
14:45 – 15:10	The Limiting Effect of Breaking in Strongly Nonlinear Waves on Intermediate Water Depth, with Emphasis on the Kinematics	Grue J., Kolaas J., Jensen A.
15:10 – 15:30	Coffee Break	
Session 7	CHAIR: A. HERMANS	
15:30 – 15:55	The Latest Trends and Future Outlook of Floating Offshore Wind Turbine (Invited Presentation)	Yamaguchi Y. (Class-NK)
15:55 – 16:20	Mean Drift Loads on Arrays of Free Floating OWC Devices Consisting of Concentric Cylinders	Konispoliatis D.N., Mavrakos S.A.
16:20 – 16:45	Multi-resonant Compressible Wave Energy Devices	Kurniawan A., Greaves D., Hann M., Chaplin J.
16:45 – 17:10	Latching Control Theory for Wave Energy Conversion	Sheng W., Alcorn R., Lewis A.
17:10 – 17:35	Effects of Wave Spreading on Performance of a Wave Energy Converter	Sun L., Zang J., Eatock Taylor R., Taylor P.H.
18:00 – 19:00	IWWF Steering Committee Meeting	
19:30 – 21:30	Dinner	

TUESDAY, APRIL 1, 2014

Session 8	CHAIR: B. MOLIN	
08:15 – 08:40	The Interaction of a Submerged Object with a Very Large Floating Platform	Hermans A.J.
08:40 – 09:05	Wave Induced Hydroelastic Behavior of the Vertical Circular Cylinder with Liquid Filled Tank at the Top	Malenica S., Choi Y.M., Vladimir N., Kwon S.H., Chen X.B.
09:05 – 09:30	Transient Flexural Gravity Wave Motion in the Presence of Floating and Submerged Plate System	Mohanty S.K., Sahoo T.
09:30 – 09:55	Radiation of Waves by a Cylinder Submerged in the Fluid Beneath an Elastic Ice Sheet with a Partially Frozen Crack	Sturova I.V.
09:55 – 10:15	Coffee Break	
Session 9	CHAIR: F. NOBLESSE	
10:15 – 10:40	Determination of the Wave Resistance of a Towed Body by the Parameters of Generated Waves	Maklakov D.V., Petrov A.G.
10:40 – 11:05	A High-order Finite-difference Solver for the Linearised Potential Flow Wave Resistance Problem on Curvilinear Overset Grids	Afshar M.A., Bingham H.B., Read R.
11:05 – 11:30	Experimental Study of High Speed Plate Ditching	Iafrati A., Siemann M.H., Benítez Montañés L.
11:30 – 11:55	A Study on the Aerodynamic Properties of a Canard-Configuration WISES	Ito Y., Iwashita H.
12:15 – 13:15	Lunch	
Session 10	CHAIR: R.W. YEUNG	
13:30 – 13:55	Analytical and Numerical Approaches to Optimizing Fluid-Structure Interactions in Wave Energy Parks	Götteman M., Engström J., Eriksson M., Isberg J., Leijon M.
13:55 – 14:20	Wave Scattering by Dual Surface-Piercing Porous and Flexible Barriers	Mandal S., Behera H., Sahoo T.
14:20 – 14:45	A New Method for the Integration of the Transient Green Function over a Panel	van Walree F.
14:45 – 15:10	Time-Domain Hydroacoustic Green Function for Surface Pressure Disturbance	Renzi E., Dias F.
15:10 – 15:30	Coffee Break	
Session 11	CHAIR: J. GRUE	
15:30 – 15:55	Roll-yaw Coupling Effects on Parametric Resonance for a Ship in Regular Waves	Greco M., Lugni C., Faltinsen O.M.
15:55 – 16:20	Study on Roll Damping around a Circular Cylinder	Kwon S.H., Kim B.J., Han S.Y., Kim Y.J., Ahn K.S., Ren D., Lu L., Jiang S.C., Chen X.B.
16:20 – 16:45	Numerical Simulation of Wave-induced Roll of a 2-D Rectangular Barge Using OpenFOAM	Chen L.F., Sun L., Zang J., Hillis A.
16:45 – 17:10	Comparisons of MPS and SPH methods: Forced Roll Test of a Two-dimensional Damaged Car Deck	Le Touzé D., Hashimoto H., Grenier N., Sueyoshi M.
17:10 – 17:30	Coffee Break	
Session 12	CHAIR: H. BINGHAM	
17:30 – 17:55	Coupled MPS-FEM Model for Violent Flows-Structures Interaction	Hashimoto H., Le Touzé D.
17:55 – 18:20	Numerical Simulation of Fluid-Structure Interaction by an Adaptive Cartesian-Grid CIP Method	He G., Kashiwagi M.
18:20 – 18:45	Numerical Simulation of Free Surface Flow Impacting on an Elastic Plate	Liao K., Hu C., Sueyoshi M.
19:30 – 21:30	Banquet Dinner	

WEDNESDAY, APRIL 2, 2014

Session 13	CHAIR: W.Y. DUAN	
08:30 – 08:55	Prediction of Added Resistance in Short Waves by CFD Simulation	Hu C., Mikami T., Yamamoto K.
08:55 – 09:20	Numerical and Experimental Analyses of Added Resistance in Waves	Kim Y., Seo M.G., Park D.M., Kim J.H., Yang K. K.
09:20 – 09:45	Improvement of Rankine Panel Method by Theoretical Consideration of Panel Forces on Ship Hull	Sasa K., Kashiwagi M.
09:45 – 10:10	Stable Finite Difference Discretizations of the Forward Speed Seakeeping Problem	Bingham H.B., Afshar M.A., Read R., Engsig-Karup A.P.
10:10 – 10:30	Coffee Break	
Session 14	CHAIR: R. PORTER	
10:30 – 10:55	Hydrodynamic Analysis of the Piston Mode Resonance Inside a Large FLNG Turret	Molin B, de Vries I., Cinello A.
10:55 – 11:20	Experimental and Analytical Study of the Piston Mode Resonance Inside WIRs (Water Intake Risers)	Remy F., Molin B.
11:20 – 11:45	Second-order Resonance among an Array of Two Rows of Vertical Circular Cylinders - Comparisons of Theoretical Calculations and Reality -	Kagemoto H., Murai M., Fujii T.
11:45 – 12:10	The Dynamics and Statistics of Wave Crest Elevations and 2nd Order near Trapping for a Semi-submersible Platform	Taylor P.H., Eatock Taylor R., Grice J., Gibson R.
12:20 –	Lunch	



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 **OSAKA UNIVERSITY**
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& Ocean Engineering