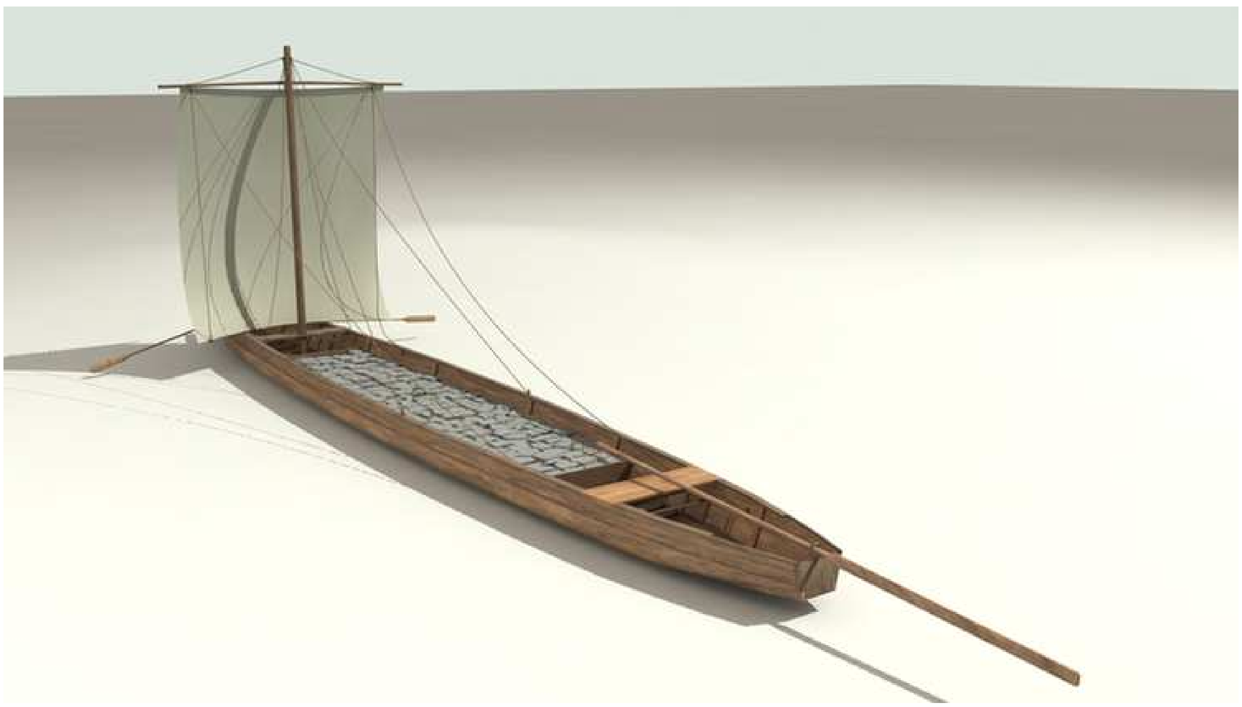
PROCEEDINGS

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

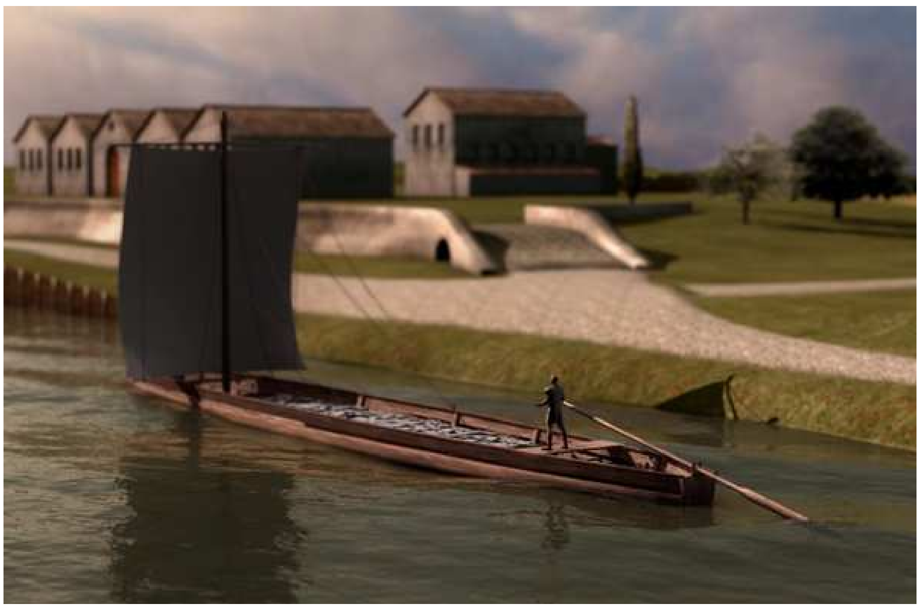


EDITORS:
BERNARD MOLIN, OLIVIER KIMMOUN, FABIEN REMY

APRIL 7-10, 2013
DOMAINE DE MOUSQUETY
L'ISLE SUR LA SORGUE, FRANCE

PROCEEDINGS

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES



EDITORS:
BERNARD MOLIN, OLIVIER KIMMOUN, FABIEN REMY

APRIL 7-10, 2013
DOMAINE DE MOUSQUETY
L'ISLE SUR LA SORGUE, FRANCE

Recovery of a barge section with the city of Arles in the background

Cover picture

The remains of a Roman river barge, 31 m long and 3 m wide, nearly intact, were recently discovered at the bottom of the Rhône river, next to Arles which was a major port in Roman times. The barge is believed to have sunk in a flood event, by the first century after Christ. It was built of oak- and pine-wood, and carried a cargo of construction stones from Saint-Gabriel quarry, upriver near Tarascon. The shipwreck has conserved its galley gear with the glazed ceramic, and one *dolium* reused as a brasero for cooking as well as other tools.

To ease its recovery, the wreck was cut into ten sections. After restoration it will be exhibited, from the fall of 2013, at the Arles Museum.

Recently many remains from Roman times have been recovered from the bottom of the Rhône river. Most famous (but not very cheerful) is the Cesar bust (below), also to be seen at the Arles Museum.

Credits: Arles Museum of Antiquity / General Council of Bouches-du-Rhône.

SPONSORS OF THE 28TH IWWWFB

HOSTED BY

Centrale Marseille

www.centrale-marseille.fr/en/home

SCIENTIFIC COMMITTEE

Bernard MOLIN, École Centrale Marseille & IRPHÉ, France
Harry BINGHAM, Technical University of Denmark, Denmark
Spyros MAVRAKOS, National Technical University of Athens, Greece
Yannis CHATJIGEORGIOU, National Technical University of Athens, Greece

LOCAL ORGANIZING COMMITTEE

Bernard MOLIN, Fabien REMY, Olivier KIMMOUN
Guillaume DUPONT, Sylvain VIROULET, Jean-Baptiste LACAZE, Yan SU

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 workers 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.

Close to 80 abstracts were submitted to this year's workshop, out of which 60 have been retained for presentation and are included in the proceedings. The contributions cover a wide range of topics related to the interaction between ocean waves and marine structures, while the authors cover all career stages from PhD students to the most senior and distinguished researchers.

This is the fourth year since the establishment of the Tuck Fellowship which, in memory of Prof. Ernie Tuck, supports the participation of one PhD student, or young researcher, each year. Nine applications for the Tuck Fellowship were received this time and the prize was awarded to Dimitrios N. Konispoliatis, a PhD student at the National Technical University of Athens, while Hugh Wolgamot, a PhD student at the University of Oxford, was selected as the runner-up.

This year's workshop is dedicated to the memories of Fritz Ursell and Enok Palm, deceased in 2012, both of them regular participants to the IWWWFB since its early years.

FRITZ JOSEPH URSELL 1923-2012

by David Evans

Fritz Ursell was one of the most distinguished applied mathematicians of his generation. He made fundamental contributions in the theory of linear water waves in a research career spanning over sixty years which inspired successive generations of researchers in the field. Perhaps less well-known to colleagues are his major contributions to other fields including aerodynamics, acoustics, mathematical methods and oceanography, these being the topics covered in the second volume of his collected papers up to 1992.

He was born in Düsseldorf and the change of government in 1933 and his Jewish ancestry prompted his parents to send him to England in 1937 for his education. Within a few months he had learned enough English to pass the Common Entrance examination into the prestigious Clifton College in Bristol. In May 1940 he moved briefly to Marlborough College which was rated highly for mathematics and in December of that year he applied for and won a Trinity College Major Scholarship at Cambridge. After obtaining first class marks in Parts I and II of the Mathematical Tripos he went on to study Part III where he attended lectures by, amongst others, Besicovich, Hardy, Littlewood, and Dirac, and obtained a distinction in the examinations. Keen to support the war effort he was recommended for a post at the Royal Aircraft Establishment but was turned down due to being classified an enemy alien. Instead, in 1943, he was posted to the Admiralty Research Laboratory in south west London and his subsequent career was determined.

After the war he stayed on at ARL working on ships in waves. He re-discovered Havelock's wavemaker theory and applied it to find the reflection from a fixed thin vertical barrier in waves and the velocity potential everywhere. This paper remains one of the few explicit solutions to the boundary-value problem for linear water waves. He then turned his attention to a half-immersed circular cylinder oscillating vertically with constant frequency. His novel approach involved expanding the velocity potential in terms of a wave source and a set of higher-order *wave-free* harmonic potentials each satisfying the free surface condition. He showed that the resulting infinite system of equations was convergent for sufficiently small wavenumbers Ka and produced the first rigorous computations for the added mass and damping for the cylinder.

The method of multipoles is now an established analytic tool in solving problems involving radiation and scattering by circular or spherical geometries and has been used in many papers presented at the Workshop over the years. Less well-known is his next paper which showed that the method could be extended to non-circular geometries by using an initial transformation. Its utility was illustrated in the paper by Choi *et al* at last year's Workshop.

In 1947 he was appointed to an ICI Research Fellowship in Manchester. Shortly afterwards he was elected to a Prize Fellowship at Trinity College for four years which Fritz regarded as the proudest day of his academic life. He was granted leave to postpone the Fellowship in order to work in the Manchester Mathematics Department whose Applied staff included Sydney Goldstein, Richard Meyer, Douglas Jones and James Lighthill.

During his time in Manchester he produced three remarkable papers on submerged circular cylinders. The first confirmed rigorously the result suggested by Dean, that the reflection of a normally incident wave by the cylinder was identically zero for all geometries and wave frequencies. He then showed, in a short but dense paper that the solution was unique. Finally he showed that if motion along the cylinder axis was allowed, there existed a trapped mode of finite energy, the first such example in water waves.

The period 1950-1961 was spent as a Lecturer in Cambridge where he met G.I.Taylor. Fritz had extended the well-known Stokes result for an edge wave travelling along the shoreline of a uniform sloping beach to show that this was just one of a family of bounded solutions of exponential type. On more than one occasion I pressed Fritz to explain how he derived these but to no avail. He just wrote the solution down. G.I. encouraged him to check the theory by doing an experiment and helped provide the equipment. The theory was confirmed.

He spent the academic year 1957-8 in the Hydrodynamics Laboratory at MIT where he met a young doctoral student Nick Newman who accompanied him back to Cambridge for the following year. In 1961 he accepted the Beyer Chair of Applied Mathematics at Manchester in succession to Lighthill. One of Fritz's students at Cambridge was a young Australian, Ernie Tuck who chose to stay on and work with him for a second year and spend his third year in Manchester. Fritz was elected to the Royal Society in 1972 and remained at Manchester until his retirement in 1990 during which time he graduated thirteen doctoral students and continued to produce a steady stream of high-quality papers on water waves. Amongst these was his 1964 paper on the decay of the free motion of a half-immersed cylinder, in which he proved the remarkable result that the cylinder ultimately came to rest monotonically in time rather than being sinusoidally damped. This paper continues to attract interest and discussion as the paper by Meylan & Ralph in last year's Workshop illustrates.

It was my good fortune to be taught by Fritz as a final year undergraduate, to be supervised by him as a PhD student and to work with him for three years as a colleague on the staff at Manchester. His lectures, just like his research papers were models of clarity and precision, but again, like his papers, they contained a depth of detail only revealed on closer study.

He was very much a 'hands-off ' research supervisor, allowing me to wrestle with difficulties for up to six weeks or more before gently inquiring of me, during the morning coffee break, 'and how are we getting on?' On one occasion I went to see him with a problem I had which he was unable to resolve but which I finally sorted out on my own a week later. When I told him, he smiled and said that he had realised the answer just after I had left but thought it best that I work it out for myself. He gave me advice over getting one's work published which included writing at least four drafts before submitting to a journal. I was somewhat bemused therefore to be handed a draft manuscript of his 1964 paper mentioned above, full of corrections and insertions in the margins which was clearly the only version he wrote.

As a junior colleague I was very much in awe of him because of his reputation and position and it was many years later before I plucked up the courage to address him as Fritz. In fact I needn't have worried. He was a kind and gentle man, not one to stand on ceremony and wholly supportive of his former students, myself included, throughout their careers.

Aside from his consummate skills as a mathematician, Fritz was a true renaissance man, capable of conversing knowledgeably yet modestly, on a wide range of subjects including European history, politics, music, and literature, especially Shakespeare.

There can be little doubt that Fritz's clear open style and rigorous approach to research, as well as his encouragement of younger researchers influenced Nick and myself when we met with our own students and research assistants at the Hamburg ONR Symposium to plan the idea and the format of the Workshop. That Fritz was an enthusiastic and regular participant at all but the later Workshops, suggests that we may have had some success in promoting these ideals.

Ship hydrodynamics, water waves and asymptotics, Collected papers of F Ursell 1946-1992, Volumes 1 & 2, Advanced Series on Fluid Mechanics, 1994, World Scientific Publishing.

ENOK JOHANNES PALM 1924-2012

by John Grue

Enok Palm is mostly recognized within the natural science for his contributions to the understanding of mean flow fluxes in the atmosphere. In a joint work with his contemporary, the meteorologist Arnt Eliassen, they explained mathematically the formation of lee waves and particular cloud patterns driven by air-flow over mountains. They showed that the vertical flux of horizontal momentum does not change with height, a fundamental property and of importance in the study of fine scale atmospheric flow. They proved this for both short and long waves. Their findings have provided a basis for quite wide generalizations within the research fields of meteorology and numerical weather forecasting, and one is referring to Eliassen-Palm theory, the Eliassen-Palm theorem, EP-fluxes, Eliassen-Palm diagnostics, etc.

Enok Palm was educated and had his scientific break-through in a dedicated research group within mathematical meteorology and hydrodynamics at the University of Oslo, Norway. Developing from what is referred to as the *Bergen School of Meteorology* – this has provided the basis for much of modern weather forecasting; it was founded by the meteorologist Vilhelm Bjerknes and his younger co-workers almost 100 years ago – this was a vital scientific environment that over the years attracted many talented students. Mathematical problems relating to fronts, stability, waves and transition to turbulence in atmospheric motion occupied this lively group. It was led by the hydrodynamicist Einar Høiland, Vilhelm Bjerknes' last Carnegie assistant. For a few years in the 1950s the group was one among a few leading centers within international meteorology. The Oslo-environment attracted longer and shorter visits by leaders like Carl-Gustaf Rossby, Erik H. Palmén, Jule G. Charney, Eric Eady, Norman A. Phillips and others. Many of the young Norwegian members were invited to work as specialists in dedicated research groups in the United States (including Ragnar Fjørtoft and Arnt Eliassen who with John von Neumann at Princeton pioneered on numerical weather forecasting), and Enok Palm was invited to give lectures on mountain waves at Department of Meteorology, University of California, Los Angeles, in the academic year 1954-1955, a lecture series that was motivated by several airplane accidents that had occurred in the mountain driven wavy flows.

After the mountain waves, Enok Palm worked on various problems relating to stability of flow. One of them was pattern formation in supercritical Rayleigh-Bénard convection which he analysed by a set of truncated Fourier series including terms up to cubic interaction. In the analysis he derived a coupled set of amplitude equations for the two preferred waves where the instability caused both modes to grow (the solution to bifurcate). The combination of the modes gave the supercritical hexagon pattern. The derivations of the amplitude equations were a key-point in his analysis. Equally essential is the physical modeling where he incorporated the kinematic viscosity's variation with temperature, a feature that was known from experiments to be important in cellular convection. With the mathematical model he was, for the first time, able to obtain theoretically the formation of hexagons in Rayleigh-Bénard convection (published in JFM in 1960).

It is noted that P.G. Drazin and P.H. Reid in their textbook *Hydrodynamic stability* write that the first to derive the 'Landau equation' (referring to Lev D. Landau's work from 1944) from the system of partial differential equations were Enok Palm (on thermal convection), and J. Trevor Stuart and J. Watson (on plane parallel flows) (all publications in 1960). Regarding Enok Palm's work that is not true; he worked with a set of equations for two amplitudes with initial conditions for both. Enok Palm's analysis is similar to the now famous model Ed. Lorentz was working on (they knew each other well), developing a flow model with a truncated set of three equations, and a corresponding set of three initial amplitudes. To include several initial amplitudes in a Landau equation is not straight forward.

Theoretical studies of nonlinear instability and pattern formation developed from the early sixties and have become important research topics within several branches of the natural science and applied mathematics. Enok Palm expanded on his 1960-work in the years that followed. Derivation of a set of nonlinear amplitude equations (later he began working with Landau equations) for analysis of various fluid processes with coefficients obtained from perturbation analysis was the main angle of attack. Some of the processes he and his students investigated were linearly stable but unstable to finite amplitude perturbations. Thermal convection, perturbation methods and subjects in nonlinear mechanics entered in the regular teaching in hydrodynamics at the University of Oslo from the 1960s.

In 1960 Enok Palm was appointed Professor of Mechanics at the Norwegian Institute of Technology in Trondheim, now the Norwegian University of Science and Technology. In 1963 he was back in Oslo, appointed as Professor of Applied Mathematics, a chair that dates back to 1814 and the time when the University was founded (in 1811). His research group continued the work on stability problems including pioneering work on algebraic instability, lift-up effect and transition to turbulence in plane shear flows.

Enok Palm and the IWWWFB

One may say that the oil-age in Norway began in 1971 with the successful production start on the Ekofisk field of ConocoPhillips in the North Sea. With this followed a considerable need to train candidates for the new industry. Enok Palm quickly realized that students with a background in theoretical mechanics would be highly useful to the various jobs that came with offshore engineering. Moreover the industry expressed new research needs, particularly within the natural sciences. At Department of Mathematics of University of Oslo which hosts the research group in fluid mechanics (Mechanics Division) Enok Palm met with the Manager, Jan Erlvang. They together decided that Enok takes up research and training in relation to the new industrial needs, and the Department gives priority and funds the activity. This was the start of marine hydrodynamics at the University of Oslo.

As a first year student at the University the academic year 1976/77 I took the introductory course in mechanics, lectured by Professor Palm. Besides the classical subjects like Newton's laws, conservation of momentum, planetary motion etc., he described glimpses of his new research on wave analysis of ships and offshore structures. Where I sat listening in the lecture room, I asked myself, what could be more useful than applying mathematics skills to such an important dimension, calculating the safety within the new offshore industry? That was my first encounter with the subject of marine hydrodynamics. Later I became his student, close colleague and friend.

To take up research on marine hydrodynamics was a start from scratch; Enok really did a serious job. One of the first things he did was to visit leading research groups in the field. One such visit was to Netherlands Ship Model Basin where he learned about the measurements by Johan Wichers, finding that the slow drift motion of a moored ship had a stronger damping when there were incoming waves than when the sea was calm (published by J.E.W. Wichers and M.F. van Sluijs in 1979). This problem motivated the research in marine hydrodynamics at the University of Oslo. He organized colloquia on: integral equations, second-order radiation and diffraction, slender body theory, nonlinear waves, Green functions. Another subject was Fritz Ursell's work on wave reflection from a submerged cylinder. Enok's method was the same as he had experienced himself as a young student; the students were put at work! We all had to present (many!) seminar lectures, and the rule was, that those students who worked hardest and presented the most, also benefitted most. Our teacher was always attending the seminar lectures and he performed a keen, detailed examination of the presenter's lay-out. When the new course in *marine hydrodynamics* was introduced in Oslo the academic year 1980/81, I – as the youngest in the group of master students – was put to lecture Nick Newman's book. Our education was very well taken care of.

What came out as research in marine hydrodynamics from Oslo, after all, is a mathematical formulation of the complete slow drift damping problem with a numerical implementation in the code WAMIT (we denote this version by WAMITUIO). The program is in use by Det Norske Veritas and other companies in the world wide offshore industry. Problems on wave and current interaction of floating geometries in two and three dimensions occupied the research group, first with me as Enok's student, and later with Enok and me together with new students. Enok and I began working on internal waves, also motivated by industrial needs. Enok contributed regularly to the Workshop from 1987 and co-chaired the 4th. His last was the Spitzbergen-Workshop in 2005.

P.G. DRAZIN & W.H. REID *Hydrodynamic stability*, Cambridge University Press, 1981.

28TH IWWWFB PROGRAM

SUNDAY, APRIL 07, 2013

9:00-12:00	Registration	
9:30-11:30	Tour to Fontaine de Vaucluse	
12:15-13:15	**Lunch**	
13:30-13:45	Welcome - Opening remarks	
SESSION 1	CHAIR J.N. NEWMAN	
13:45-14:07	A second order ordinary differential equation for the frequency domain Green function	Clément A.H.
14:07-14:30	Evaluation of time-domain capillary-gravity Green function	Dai Y., Chen X.-B.
14:30-14:52	Expansion formula for velocity potential for wave interaction with floating and submerged structures	Mohapatra S.C., Sahoo T.
14:52-15:15	A novel connection between the Ursell and Dean vertical barrier potentials	Porter R., Evans D.V.
15:15-15:40	**Coffee break**	
SESSION 2	CHAIR A. HERMANS	
15:40-16:02	A note on added resistance for slow ships	Bingham H.B., Afshar M.A.
16:02-16:25	Illustrative applications of the Neumann-Michell theory of ship wave	Huang F., Li X., Noblesse F., Yang C., Duan W.-Y.
16:25-16:47	The limits of applicability of shallow-water wave theory	Doctors L.J.
16:47-17:10	A nonlinear calculations of interfacial waves generated by a moving ship and evaluation of the forces in the dead water problem	Grue J.
17:10-17:35	**Break**	
SESSION 3	CHAIR W.-Y. DUAN	
17:35-17:57	Semi analytical solution for second order hydroelastic response of the vertical circular cylinder in monochromatic water waves	Choi Y.M., Malenica S.
17:57-18:20	Time-domain hydro-elastic dynamic analysis of a large floating body including second-order wave loads	Kang H.Y., Kim M.H.
18:20-18:42	Whipping response of a box barge in oblique seas	Piro D.J., Maki K.J.
19:00-20:00	**Welcome party**	
20:00-21:30	**Dinner**	

Monday, April 08, 2013

Session 4	Chair O.M. Faltinsen	
8:15-8:37	Hydrodynamic impact of three-dimensional bodies on waves	Scolan Y.-M., Korobkin A.A.
8:37-9:00	Numerical and experimental studies of plate ditching	Iafrati A., Calcagni D.
9:00-9:22	Wagner-type models of water impact with separation for a finite wedge	Korobkin A.A.
9:22-9:45	The impact of a fractionally (viscoelastic) damped system onto the water free surface	Casetta L., Franzini G.R., Pesce C.P.
9:45-10:07	Multiple oblique impacts on thin liquid layer with restoring forces	Khabakhpasheva T.I., Korobkin A.A.
10:07-10:30	**Coffee break**	
Session 5	Chair H.B. Bingham	
10:30-10:52	A model test for the wave interaction with a four-cylinder structure	Cong P.W., Teng B., Zhang K., Huang Y.F.
10:52-11:15	Second-order resonance among an array of two rows of vertical circular cylinders	Kagemoto H., Murai M., Fujii T.
11:15-11:37	Cloaking a circular cylinder in deep water	Newman J.N.
11:37-12:00	An experimental study of near-cloaking	Dupont G., Kimmoun O., Molin B., Guenneau S., Enoch S.
12:00-12:22	Radiation and trapping behaviour of arrays of truncated cylinders	Wolgamot H., Eatock Taylor R., Taylor P.H.
12:30-13:30	**Lunch**	
Session 6	Chair J. Grue	
13:45-14:07	On the dispersive modeling of the 2011 Tohoku tsunami generation by coseismic/SMF processes, and near- and far-field impact	Grilli S., Harris J.C., Kirby J.T., Shi F., Ma G., Masterlark T., Tappin D., Tajalli Bakhsh T.S.
14:07-14:30	A comparison of simulation approaches based on the Zakharov equations for nonlinear waves in the coastal zone	Benoit M., Yates M.L., Chazel F.
14:30-14:52	Extreme wave run-up on a vertical cliff	Carbone F., Dutykh D., Dudley J.M., Dias F.
14:52-15:15	Free surface determination from pressure measurements at the sea bed	Clamond D.
15:15-15:40	**Coffee break**	
Session 7	Chair R. Eatock Taylor	
15:40-16:02	Lagrangian modelling of extreme wave groups	Buldakov E.V.
16:02-16:25	Stokes drift and net transport for two-dimensional wave groups in deep water	Van den Bremer T.S., Taylor P.H.
16:25-16:47	Wave simulation in a 3D coupled numerical and physical wave basin	Yang Z.W., Bingham H.B., Liu S.X.
16:47-17:15	**Break**	
Session 8	Chair D.V. Evans	
17:15-17:37	Trapping of time-harmonic waves by freely floating structures consisting of multiple bodies (motionless and/or heaving)	Kuznetsov N., Motygin O.
17:37-18:00	Shapes of zero wave resistance and trapped modes	Makasyeyev M.V.
18:00-18:22	Near trapping and the singularity expansion method	Meylan M.H., Fitzgerald C.
18:22-18:45	Physics of sloshing impacts in tanks of membrane LNG carriers	Brosset L. (GTT)
19:00-19:45	**IWWWFB Steering Committe Meeting**	
20:00-21:30	**Dinner**	

TUESDAY, APRIL 09, 2013

SESSION 9	CHAIR A. IAFRATI	
8:15-8:37	Numerical simulation of fluid-structure interaction using a level-set immersed boundary method	Bai W., Huo C.
8:37-9:00	Two-dimensional and three-dimensional simulation of wave interaction with an oscillating wave surge converter	Rafiee A., Dias F.
9:00-9:22	A numerical strategy for gas cavity-body interactions from acoustic to incompressible liquid phases	Colicchio G., Greco M., Faltinsen O.M.
9:22-9:45	Fluid-structure interaction during wave-impact with air-entrapment in a sloshing tank	Lugni C., Bardazzi A., Faltinsen O.M., Graziani G.
9:45-10:07	Collision of two liquid wedges	Semenov Y.A., Wu G.X., Oliver J.M.
10:07-10:30	**Coffee break**	
SESSION 10	CHAIR F. NOBLESSE	
10:30-10:52	Hyper-singular integral-equation for a finite-draft surface piercing cylindrical shell at high and low-frequency	Yeung R.W., Nokob M.H.
10:52-11:15	Numerical analysis of floating-body motions in arbitrary bathymetric domain	Kim T., Kim Y.
11:15-11:37	Towards real time simulation of ship-ship interaction. Part II: double body flow linearization and GPU implementation	Lindberg O., Glimberg S.L., Bingham H.B., Engsig-Karup A.P., Schjeldahl P.J.
11:37-12:00	A real-time simulation technique for ship-ship and ship-port interactions	Pinkster J.A., Bhawsinka K.
12:00-12:22	Simplified formulation for parametric roll in regular and irregular waves	Song K.-H., Kim Y., Park D.-M.
12:30-13:30	**Lunch**	
SESSION 11	CHAIR J.A. PINKSTER	
13:45-14:07	Hydrodynamic interaction among multiple cylindrical OWC devices restrained in regular waves	Konispoliatis D.N., Mavrakos S.A.
14:07-14:30	Capture width for arrays of wave energy converters	Farley F.J.M.
14:30-14:52	External dynamics system of twin floating bodies for perfect wave absorption	Minoura M., Hirao C., Miyazaki Y., Kashiwagi M.
14:52-15:15	Wave-power extraction from a finite array of oscillating wave surge converters	Renzi E., Dias F.
15:15-15:37	Demonstrating the feasibility of a distensible-tube WEC with a distributed power take-off	Rainey R.C.T., Chaplin J.R.
15:37-16:05	**Coffee break**	
SESSION 12	CHAIR A.A. KOROBKIN	
16:05-16:27	Evolution of water waves generated by sub-aerial deformable landslide	Viroulet S., Kimmoun O., Kharif C.
16:27-16:50	Modelling wave interaction with a surface-piercing vertical cylinder using Open-FOAM	Chen L.F., Morgan G.C.J., Zang J., Hillis A., Taylor P.H.
16:50-17:12	Focused wave impact on a vertical cylinder: Experiment, numerical reproduction and a note on higher harmonics	Paulsen B.T., Bredmose H., Bingham H.B.
17:12-17:35	Dissipation around rolling boxes	Lu L., Chen X.-B., Teng B., Gou Y., Jiang S., Guo X.
17:35-17:57	The application of velocity decomposition to airfoil problems	Rosemurgy W.J., Maki K.J., Beck R.F.
18:00-18:15	ONRG and the associated hydrodynamics related programs	Lin W.-M.
19:00-	**Banquet dinner**	

Wednesday, April 10, 2013

Session 13	Chair N. Kuznetsov	
8:30-8:52	The wave radiation problem in a two-layer fluid by time-domain method	Gou Y., Chen X.J., Wang G.B., Teng B., Ning D.Z.
8:52-9:15	GN equations to describe internal solitary waves in two-layer fluid	Zhao B.B., Duan W.Y.
9:15-9:37	Wave forces on oscillating horizontal cylinder submerged under non-homogeneous surface	Sturova I.V.
9:37-10:00	On the wave resistance of an immersed prolate spheroid in infinite water depth	Chatjigeorgiou I.K., Mavrakos S.A., Miloh T.
10:00-10:20	**Coffee break**	
Session 14	Chair M. Kashiwagi	
10:20-10:42	Time dependent flexural gravity wavemaker problem	Mohanty S.K. , Mondal R., Sahoo T.
10:42-11:05	The effect of a vertically sheared current on rogue wave properties	Kharif C., Viroulet S., Thomas R.
11:05-11:27	Current effects on higher harmonic waves	Ning D.Z., Lin H.-X., Teng B.
11:27-11:50	Hybrid-spectral model for fully nonlinear numerical wave tank	Christiansen T.B., Engsig-Karup A.P., Bingham H.B.
11:50-12:00	Closure	
12:30-13:30	**Lunch**	