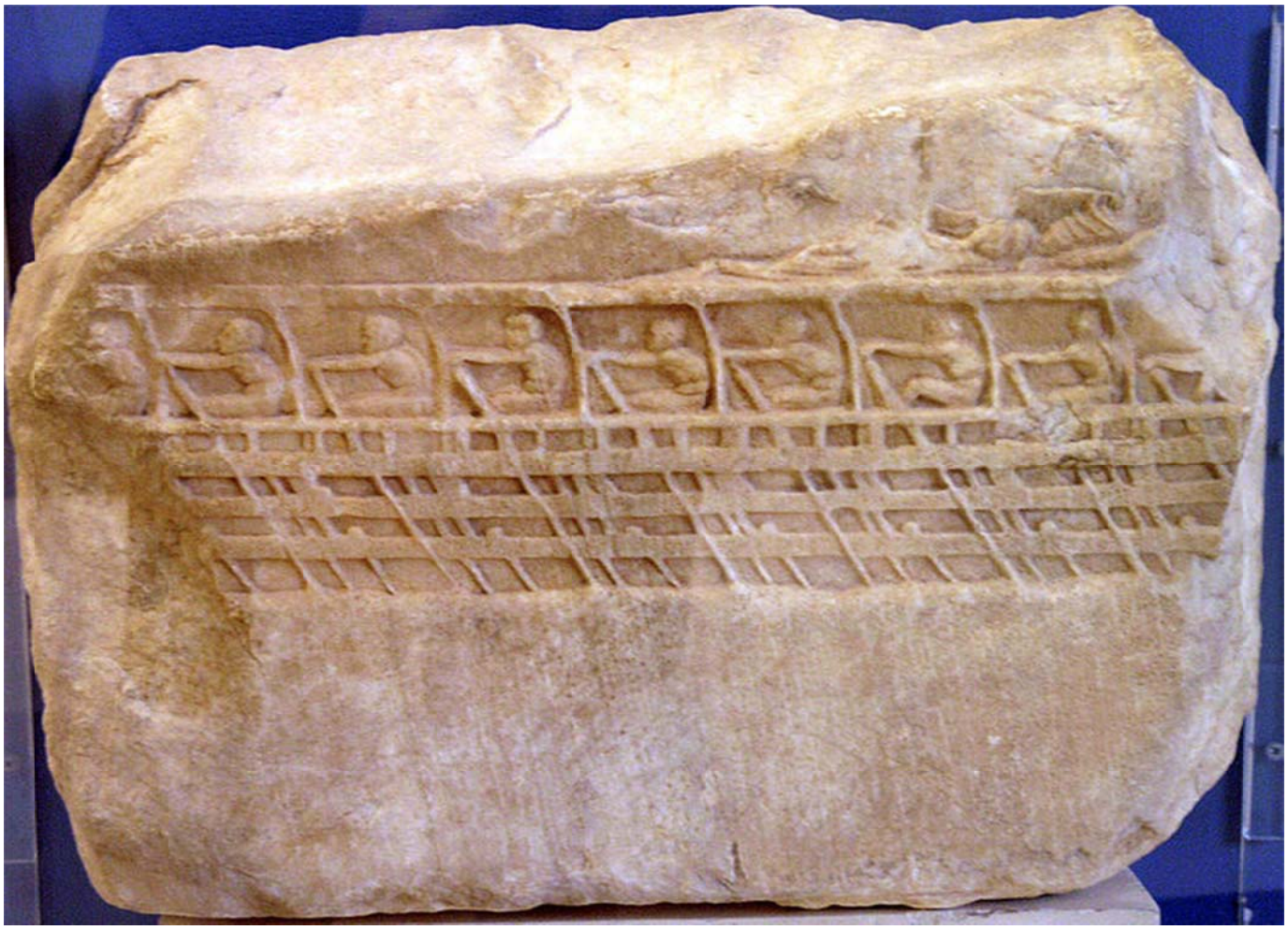
Proceedings

26th International Workshop on Water Waves and Floating Bodies



Editors:

S A MAVRAKOS and I K CHATJIGEORGIOU

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Photo in the cover page:

Shows an anaglyph of an ancient Athenian Trireme (Triiris). Around 410-400 bc. It was found in 1852 by LeNorman and it is exhibited in Acropolis Museum. Triremes were warships with three rows of oarsmen at each side. Warships of this type were used by the Athenian Admiral Themistocles to defeat the Persian fleet under Xerxes during the sea battle in Salamis in 28 or 29 of September 480 b.c.

The organizing committee of the 26th International Workshop on Water Waves and Floating Bodies greatly acknowledges the financial support provided by the following sponsors

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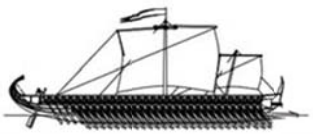

Σ.Δ.N.M.E

Forward

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 bodies. The Workshop 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. In the organization and conduct of the Workshop, particular emphasis is given to the participation of younger researchers, interdisciplinary discussion between engineers and scientists, and the presentation of preliminary work before it is published elsewhere.

Since its inception, the Workshop has grown from strength to strength and annually brings together marine hydrodynamicists, naval architects, offshore and arctic engineers and other scientists and mathematicians, to discuss current research and practical problems. Attendance is restricted to the authors of submitted extended abstracts that are reviewed for acceptance by a small committee. The Proceedings of each Workshop include Introductions with background information, copies of the extended abstracts, and recorded discussions. The proceedings of the previous workshops are available online at www.iwwwfb.org

Letter from the Organizers

Professor Dr.-Ing.
Spyros A. Mavrakos
Workshop Chair

Associate Professor Dr.-Eng.
Ioannis K. Chatjigeorgiou
Workshop Co-Chair

The Conference Co-Chairs and the local organizing committee would like to welcome you to the 26th International Workshop on Water Waves and Floating Bodies. This year it takes place in the Metropolitan Athens Hotel and it is organized by the Laboratory of Floating Structures and Mooring Systems of the National Technical University of Athens, Greece. The Hellenic (Greek) peninsula known also as Emos peninsula is completely surrounded by sea having approximately 16,000km of coast lines. From ancient years Greeks were always pioneers in maritime activities and established a famous nautical legacy characterized by a relation of dependence from Water Waves and interdependence with Floating Bodies. It is indeed a great honor for us that we organize IWWWFB2011!

This year we received a sufficient amount of abstracts from 20 countries and 4 continents that deal with several aspects of hydrodynamics, including, but not limited to, fluid dynamics, nonlinear hydrodynamics, water entry, CFD, etc. An adequate amount concerns novel concepts for wave energy extraction which is admittedly breakthrough technology and attracts more and more the interest of both academia and industry. The proceedings include 55 scientific works in which the intelligence and experience of senior researchers are optimally combined with the momentum of sharp-minded young researchers. It is very encouraging that many of the authors are relatively young in age. They will definitely enhance in the future the gained scientific knowledge on that difficult but highly attractive discipline.

The 26th International Workshop of Water Waves and Floating Bodies is dedicated to Professor Odd Magnus Faltinsen for his lifetime scientific achievements. Professor Faltinsen is internationally recognized for his outstanding contributions in the scientific field of ships and offshore hydrodynamics with emphasis on slamming and water entry problems, body-wave-current interactions, high-speed vessels and liquid sloshing dynamics. The organizing committee is proud to honor Professor Faltinsen and hopes that he will continue researching, teaching and inspiring students for many years to come.

In concluding, we sincerely hope that all attendees will pass three enjoyable and memorable days combining work and fun.

Wishing a pleasant stay to all…

Yours, sincerely

Spyros Mavrakos *Yannis Chatjigeorgiou*

With a great pleasure the organizing committee announces that the 26th International Workshop of Water Waves and Floating Bodies, is dedicated to Professor Odd Magnus Faltinsen for his lifetime scientific achievements.

Professor Odd Magnus Faltinsen

Professor Faltinsen is known for his work in ships and offshore hydrodynamics with particular emphasis on slamming and water entry problems, body-wave-current interactions, high-speed vessels and liquid sloshing dynamics. He has written three textbooks on the subjects. Professor Faltinsen has developed theoretical and numerical methods for explaining how ships, high speed vehicles, and offshore structures behave in waves. The so called SFT -Salvesen-Faltinsen-Tuck method to estimate wave induced movements and loads on ships presented in 1970 is still used as an engineering tool today. He has also developed with colleagues methods for analyzing the impact of sloshing on the ships and he made extensive studies of slamming loads.

At this point the organizing committee withdraws leaving space to the people, who know Professor Faltinsen better, his colleagues and students….

A note to the Odd M. Faltinsen Celebration

by Carl M. Larsen

Odd Faltinsen deserves to be celebrated. His professional life is not only long – he started his remarkable career 43 years ago – but the quantity and quality of his work is unique. The most impressive figures are probably those describing his effort for PhD education: He has been the main supervisor for 48 candidates, and at the age of 67 he has another 10 in the pipeline. He has been member of doctoral committees on 23 occasions at 10 different universities. But let us start from the beginning.

Odd grew up in Stavanger and finished high school in 1963. I came to know him at that time; we both had orienteering as our favorite sport. But Odd did not follow up his promising junior career. During his master study at University of Bergen his landscape shifted from forest and marshland to applied mathematics. The marine technology community should be grateful for that choice. Like many Norwegian at that time he went to USA for his PhD study, and defended his degree at University of Michigan in 1971. His supervisor there was professor Ogilvie, and they became colleagues and close friends. Returning to Norway and his job at Det Norske Veritas he came to a country that recently had understood that it had become an oil nation. We could of course have opened up our continental shelf to international oil giants and remained on shore with our mountains, glaciers and fjords. But it was a national aim to participate in the oil activity, and DNV became one major player in this game. Odd started to develop computer programs for calculation of floater motions on computers with 256 Kb memory and 10 Mb disk capacity. The Norwegian Institute of Technology (NTNU today) was also given an important role to build national competence in offshore engineering. We had an internal fight between Civil Engineering and Naval Architecture about the leadership. Odd started his academic career as associate professor at Civil, but when he accepted a position as professor in marine hydrodynamics at Naval Architecture, the battle was closed! Another outstanding professor, Torgeir Moan, was appointed at the same time. These two colleagues have had a fruitful cooperation in almost 40 years and have had a strong impact on education and research in naval architecture and offshore engineering. It is hard to imagine a Department of Marine Technology at NTNU without the two.

Odd Faltinsen has not only published more than 300 papers in journals and international conferences, published 3 books (translations to Chinese and Korean exist), given an unknown number of keynote lectures, been active during more than 20 years in ITTC, organized conferences like FAST, PRADS, and Hydroelasticity in Marine Technology, been editorial board member for 4 international journals, and been visiting professor on 3 continents. He has also been involved as leader or key scientist in research programmes and centre at NTNU with the Centre of Excellence on Ships and Ocean Structures (CeSOS) as the last and most prestigious. On the international scene Odd holds honorary positions at University College London and Harbin Engineering University, and he is foreign member/associate of Chinese Academy of Engineering and National Academy of Engineering of USA, in addition to his three memberships in Norwegian academies. And finally - believe it or not - he has been head of department and associate dean, and member of Board of Directors for MARINTEK or other research units in Trondheim almost continuously during his career. And the only occasions he could work more than 24

hours a day are during flights westwards and a Sunday in October when time shifts from daylight saving to normal.

I have had the pleasure of being Odd's colleague for more than 30 years. I have learned a lot from him, not only on hydrodynamics but also about all aspects of academic work and the role of universities in an international world. I know him as a generous person that always has time for a question and that always will give from his rich experience and wisdom. I have heard numerous stories about academic competition, but Odd is an extraordinary example of academic cooperation. It is a good decision to dedicate the 26th International Workshop on Water Waves and Floating Bodies to Odd Faltinsen.

A note for Odd Magnus Faltinsen

by Marilena Greco

I will never be able to call Odd Magnus Faltinsen by his first name. He is and always will be my Professor. As I often repeat to him, someone in the sky must love me very much to let me meet him as one of my scientific fathers. My luck is not only due to Prof. Faltinsen's strong knowledge and outstanding research contributions in the marine field, but also to his human qualities. This great combination makes him a unique scientist and a wonderful person.

Concerning his career: Odd Magnus Faltinsen was born in Stavanger in 1944. He obtained the cand. real. degree in Applied Mathematics at the University of Bergen in 1968 and was able to gain in just 16 months his PhD degree in Naval Architecture and Marine Engineering in 1971 at the University of Michigan. He started his career at Det Norske Veritas (DNV) from 1968 to 1974, and was appointed docent in Marine Technology at the Norwegian Institute of Technology in 1974. The University is now known as Norwegian University of Science and Technology, NTNU. In 1976, at only 32 years, he was promoted to full professor of Marine Hydrodynamics. Since 2002, he is also connected to the worldwide well known Centre for Ships and Ocean Structures (CeSOS) of Trondheim. He has been visiting professor 3 times 1-year periods at the Massachusetts Institute of Technology, USA, and 3 months at the Research Institute of Applied Mechanics, Kyushu University, Japan. He is a honorary professor at Harbin Engineering University, academic master at Dalian University of Technology and visiting professor at University College of London. He has educated close to 50 PhD and is presently supervising 11 PhD students. He has been host for about 20 researchers (post. doc. and professors) from Croatia, France, Italy, Ukraine, China, Japan, South Korea and USA. Odd Magnus Faltinsen is the author of the three textbooks: *Sea loads on Ships and Offshore Structures* (1990), which is extensively used world-wide, and has also been translated into Chinese and Korean, *Hydrodynamics of high-speed marine vehicles* (2005) and *Sloshing* (2009), also translated into Chinese. The last book is co-authored by Alexander N. Timokha. He has authored more than 300 scientific publications in journals, conferences and books, and given about 40 keynote and honours lectures. He has been involved in arranging about 10 international conferences in Trondheim and is one of the initiators of the Boss, Fast and Hydroelasticity in Marine Technology, conferences that started in Trondheim.

Concerning his research interests and achievements: His experience in hydrodynamically related problems for ships and offshore structures is very wide and deep. Important research topics of his activity have been hydroelasticity, high-speed vehicles and sloshing tanks. He has developed theoretical and numerical methods for the seakeeping of ships, high speed vehicles, and offshore structures. Just to mention some of his research contributions: his cooperation with Prof. Nils Salvesen and Prof. Ernie Tuck produced in 1970 the strip theory, still widely used as practical engineering tool; his hydroelasticity investigations for extreme impacts on flat plates highlighted the irrelevance of high slamming pressures onto the maximum slamming-induced structural stresses; his long friendly cooperation with Dr. Rong Zhao on slamming and water-entry problems provided for instance the generalized Wagner method, valid

for a wider range of impact angles than the classical Wagner method and recognized as valuable practical engineering tool, other important outcomes have been Boundary Element Methods for slamming and water entry of 2D ship cross-sections and their application within the high-speed nonlinear 2D+1/2 theory; his close cooperation with Prof. Alexander N. Timokha on sloshing problems produced for instance the multimodal method, an efficient and valuable semi-analytical method for analysing 2D and 3D sloshing induced loads on ship tanks for a wide range of filling depths.

Concerning his international acknowledgement: As a result of his profound experience in the marine field, he has been member of 5 International Towing Tank Conferences (ITTC) committees, including 2 as chairman, and 3 International Ship Structure Committees (ISSC). More impressively, he has been named the 15th George Weiblum lecturer (1992-1993) and he is member of the Norwegian Academy for Technical Sciences, Norwegian Academy of Science and Letters, The Royal Norwegian Society of Sciences and Letters, foreign associate of the National Academy of Engineering of the United States of America and foreign member of the Chinese Academy of Engineering.

A person like him that has written forever his signature in the marine field can easily make the others feel uneasy. So you can imagine how I felt the first time I met him, also scared in such a north country. But all these feelings lasted for a very short time. He and Norway opened so many opportunities for my Life that I will never be able to thank them enough.

He is a wonderful teacher. It is thanks to his easy and clear way of communicating if, despite my little knowledge of English, I was able to get the highest grade in Hydro I, well known as one of the most important and difficult exams in our PhD program. He is a great supervisor. He patiently listened to my presentations before conferences to help improving my English and performance, carefully corrected my papers and thesis, and above all shared my studies and research. I have a beautiful memory of him checking with me the probes to use for the water-on-deck experiments, filling a sink with water and then pushing back and forth the probe. He supported me during and after my PhD and I have never finished learning from him. As he likes to tell me, I need to have his every-day preach. I'm just one of his 'children' and I can guarantee that every single of his students shares my gratitude, my closeness and my affection to him.

He is a true friend. I received from him so many suggestions for my Life that I could easily make a book by simply listing them. It is amazing to find in him so many qualities: his deep honesty, his modesty, his respect for the people, his care. Once in Rome I sang for him and Bente, his wife, but I never wrote poetry for him. Now, in connection with such a culture heart as Greece, I must try at least to use the poetry to tell a bit about him. I hope he likes the thoughts if not the words.

"Special recipe for a unique mind...
baby's eyes, to be curious of the World,
Viking spirit, to disclose firmly the doubts,
open ocean, to embrace novel starts…
ingredients rare mixed together,
softly spiced with modesty and heart…"

With affection, marilena…

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School of Naval Architecture and Marine Engineering
National Technical University of Athens

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Professor Spyros A. Mavrakos (Workshop's Chair)

Associate Professor Ioannis K. Chatjigeorgiou (Workshop's Co-Chair)

The 26th International Workshop on Water Waves and Floating Bodies

Table of Contents