

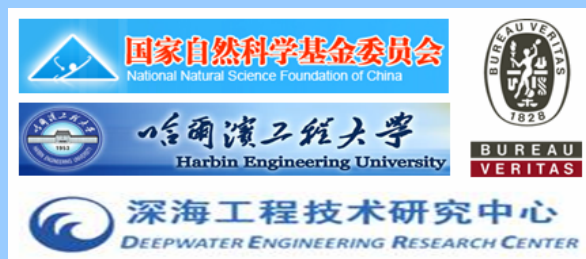
# Proceedings

## 25th International Workshop on Water Waves and Floating Bodies



9-12 May 2010

Shangri-La Hotel, Harbin, China



Edited by Wenyang Duan, Xiaobo Chen and Hongde Qin

Harbin Engineering University



# Introduction

The International Workshop on Water Waves and Floating Bodies is an annual meeting of engineers and scientists with special interests in water waves and the effects of waves on floating or submerged bodies. The workshop was initiated twenty-four years ago by Professor Nick Newman from MIT and Professor David Evans from Bristol University. Since its inception, the workshop has grown from strength to strength. It annually brings together marine hydrodynamicists, naval architects, offshore and arctic engineers and other scientists and mathematicians, from industry and academia, to discuss current research and practical problems in a focused week of activity. Attendance is restricted to the authors of submitted extended abstracts that are reviewed for acceptance by the Programme Committee. These proceedings include the extended abstract for every presentation made at the 25th workshop. The proceedings of previous workshops are available online at [www.iwwwfb.org](http://www.iwwwfb.org).

The 25th International Workshop on Water Waves and Floating Bodies is to mark the retirement of Professor R. Eatock Taylor in year 2009. Rodney has lectured and published on hydrodynamics, structural dynamics, and fluid structure interactions, with emphasis on the loading and dynamic response of offshore structures in random waves. The 2ndIWWFBB at Bristol in 1987 was the opportunity for his first participation in the Workshop, and he has attended most of the others since then and hosting the 10th Workshop in 1995.

The 25th IWWFBB is also the first time to award the Tuck Fellowship. The Tuck Fellowship, a way of memorizing Professor Tuck, is intended to support participation in the IWWFBB by a student or young researcher. There were eight applicants this year, four from the UK and one each from France, Iran, China and Japan. The Selection Committee had a tough job, but it is gratifying that we are off to such a strong start with the Tuck Fellowships. The first recipient is Phillipe Trinh, a PhD student in his final year at University of Oxford.

The 25th IWWFBB is organized by Harbin Engineering University(HEU), HEU is defining her distinctive position in the nation's development strategy by specializing in shipping industry, ocean exploration and nuclear application. The College of Shipbuilding Engineering of HEU is ranked as one of the leading institutions in China and thus enjoys the fame as 'China's shipbuilding engineers' cradle'.

## Acknowledgements

The 25th IWWFBB was jointly sponsored by the National Natural Science Foundation of China, Bureau Veritas, Harbin Engineering University, Deepwater Engineering Research Center and the “111” project. The workshop took place on 9-12 May 2010 in Shangri-La Hotel, Harbin, China.

**Wenyang Duan, Xiaobo Chen and Hongde Qin**  
**Harbin Engineering University**



Professor Rodney Eatock Taylor

# A note for Rodney Eatock Taylor

by G.X. Wu

Rodney Eatock Taylor was born in 1944. He obtained his first degree at King's College, Cambridge in 1965 (Mechanical Sciences followed by History of Art), and MSc and PhD degrees in Civil Engineering from Stanford University in 1966 and 1968 respectively. He immediately joined Ove Arup and Partners in London as a structural engineer, spending a year in design and another in R & D, and then almost accepted an offer to join Ove Arup's Opera House team in Sydney, at the stage when computer literate engineers were required for the design and the installation of the 6225m<sup>2</sup> glass walls and their supporting structures. However, he decided to make his career in academia instead: having as a child considered a possible future in the navy he joined University College London in 1970 as a Postdoctoral Research Assistant working on ship structures, with Professor R. E. D. Bishop in the Department of Mechanical Engineering. This led him and his group at UCL to pioneer the application of hydroelasticity theory, notably through the long collaboration between Dick Bishop and Geraint Price. Rodney was involved in the early stages of this work and his first paper, co-authored with Bishop in the Philosophical Transactions of the Royal Society, was concerned with hydroelastic analysis of a simple uniform beam. In 1972 Rodney became the Shell Lecturer in Ocean Engineering at UCL, and moved his main interests from ship structures to the hydrodynamics of offshore platforms. He became Reader (1980) and Professor (1984) of Ocean Engineering and was Dean of Engineering at UCL from 1988. A move to the University of Oxford in 1989 saw him become Professor of Mechanical Engineering and a Fellow of St Hugh's College. He set up the Ocean Engineering and Dynamics Group, with Andy Keane, Alistair Borthwick and subsequently Paul Taylor (all now professors). Rodney was Head of Engineering at Oxford from 1999 to 2004.

In 1990 Rodney was elected a Fellow of the Royal Academy of Engineering. He is also a Fellow of the Royal Institution of Naval Architects and of the Institution of Mechanical Engineers. From 2004-2007 he was Chairman of the Research Committee and a Vice-President of the Royal Academy of Engineering. In 2008 he was made an Honorary Fellow of University College London and an Honorary Professor of Harbin Engineering University. He was the 28th Weinblum Memorial Lecturer in 2005-06.

I first met Rodney when I went to UCL in October 1983 to do an MSc in Ocean Engineering, where Rodney was the course director. He was also the supervisor of my project, which used the strip theory in Newman's book "Marine Hydrodynamics" to predict the motion of a ship with forward speed (My biggest achievement was that I found a typo of a sign in the book). In 1984, I started my PhD under Rodney's supervision and was his first student from mainland China. I used the coupled 3D finite element method (for the inner domain) and the boundary element method (for the outer domain) to solve the linear problem of ship motion in waves. The method was quite popular at the time due to the work of Bai, Yeung and Mei and others. Rodney and I subsequently published several papers on this in various journals, including the Proc. of Roy. Soc. and JFM. While studying for my PhD, I also found Havelock and Ursell's work on water waves most interesting. Although this was not part of the PhD programme, Rodney let me pursue these interests freely. This led to a large number of joint publications over the years on analytical and semi analytical solutions for a circular cylinder and for a sphere under a variety of conditions. After my PhD, I worked with Rodney as a postdoctoral researcher on the same subject. It was a great shame to us that Rodney decided to be another of those UCL missionaries to answer the call and moved to serve a certain

provincial university at Oxford in 1989. Despite that, we continued our collaboration extensively. This was particularly reflected through many joint projects between UCL and Oxford, supported by the UK research council. Having done some extensive research into the second order problems in 1980s, we started moving into the fully nonlinear problem in early 1990s. My intention at that time was to build things up based on the BEM of Longuet-Higgins, but Rodney had the foresight to suggest that we should develop FEM. This led to a joint paper in 1994 in Applied Ocean Research. At that time, it was quite difficult to persuade people that the FEM did have several advantages and our publication was an isolated case for the nonlinear water wave problem. Today papers based on the FEM appear in explosive numbers everywhere. Our work in the 1990s on this subject continued when Q.W Ma, who is now leading his own group in this area in the City University in London, joined UCL as a research fellow and did a PhD with me there. Rodney and I subsequently proposed the coupled BEM (inner domain) and FEM (outer domain), which was a reverse of the coupled method for the linear problem in 1970s and 1980s. We also jointly developed the auxiliary function to decouple the nonlinear mutual dependence of the body motion and the fluid flow.

Rodney also helped me greatly through the years in my career. He was my principal referee when I became a lecturer in 1992 at UCL, reader in 1997 and professor in 2000. He was also my principal referee for the government sponsored visiting positions at Shanghai Jiao Tong University (started 2009) and Harbin Engineering University (started 2006). He has always been a source of strength and inspiration to me.

Knowing and working with Rodney, I am always reminded of what Douglas H. Gresham (an American) said about his stepfather, C.S. Lewis ([www.cslewis.com](http://www.cslewis.com)), one of the most famous Oxford (and, in later life, Cambridge) dons, and the author of the well known "Chronicles of Narnia". In the Introduction to Lewis' book "A Grief Observed", he wrote that Lewis was at "a time when the concepts of personal honour, total commitment to one's given word, and the general principles of chivalry and good manners were still drummed into the young British male". I cannot find any better words. These qualities that Gresham describes are exactly those of the Rodney I know, the Rodney I wished to follow and the Rodney I try to continue to follow even today.

# 25<sup>th</sup> International Workshop on Water Waves and Floating Bodies

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# Programme of 25<sup>th</sup> IWWWFB

## Saturday 8th May 2010

**14.00-18.00: Registration**

## Sunday 9th May 2010

**09.00-12.00: Registration**

**10.00-12.00: Excursions around Harbin City and Harbin Engineering University**

**12.30-13.45: Lunch**

**13.50-14.00: Welcome by Prof WY Duan (Harbin Engineering University)**

**14.00-15.40: Session 1 "Tuck Fellowship and theoretical hydrodynamics" - Prof J Grue (University of Oslo)**

14:00-14:25 "The existence and non-existence of waveless ships" by Trinh, P.H., Chapman, S.J. & Vanden-Broeck, J.M.

14:25-14:50 "Sound Scattering and Noise Control by Free Surface Piercing Cylinders" by Avital, E.J. & Miloh, T.

14:50-15:15 "Generalized Eigenfunction Method for Floating Bodies" by Meylan, M.H. & Fitzgerald, C.

15:15-15:40 "Non-uniqueness in the plane problem of steady forward motion of bodies" by Motygin, O.V. & McIver, P.

**15.40-15.55: Coffee Break**

**15.55-17.10: Session 2 "Non-linear hydrodynamics" – Prof RW Yeung (University of California at Berkeley)**

15:55-16:20 "3-D Numerical Wave Tank by CIP based Cartesian Grid Method" by Hu, C.H.

16:20-16:45 "Some numerical aspects of nonlinear free surface motions by a Method of Fundamental Solutions" by Scolan YM

16:45-17:10 "Rogue Waves Due To Nonlinear Broadband Wave Interactions" by Tao, A.F., & Liu, Y.M.

**17.10-17.25: Coffee Break**

**17.25-18.40: Session 3 "Viscous fluid dynamics" - Prof L Cheng (University of West Australia)**

17:25-17:50 "Visco-potential flow and time-harmonic ship waves" by Chen, X.B. & Dias, F.

17:50-18:15 "A 3D Navier-Stokes solver to investigate Water-On-Deck events within a Domain-Decomposition strategy" by Colicchio, G., Greco, M., Lugni, C. & Faltinsen, O.M.

18:15-18:40 "Viscous calculations of hydrodynamic forces on marine bodies" by Grue, J., Rashid, F. & Vartdal, M.

**19.00-21:00: Welcome party and Dinner**

**Monday 10th May 2010**

**8.30-10.10: Session 4 "Water Impact" Chairman – Prof O Faltinsen (CeSOS, NTNU)**

08:30-08:55 "Numerical simulation of wedge water entry based on two-dimensional two phase SPH model" by Gong, K., Wang, B.L. & Liu, H.

08:55-09:20 "Sudden Rotation of Floating Plate With Separation" by Korobkin, A.A.

09:20-09:45 "An Attempt to Demystify Flat Impact" by Oh, S.H., Kwon, S.H., Kwak, D.W. & Choi, Y.M.

09:45-10:10 "An Efficient Numerical Method For The Threedimensional Wagner Problem" by Tassin, A., Jacques, N., Neme, A. & Leble, B

**10.10-10.40: Coffee Break**

**10:40 – 12:20: Session 5 "Hydro-elasticity" - Prof A Korobkin (University of East Anglia)**

10:40-11:05 "Elastic Deformations of A Porous Circular Cylinder Fixed In Waves" by Bao, W.G. & Kinoshita, T.

11:05-11:30 "Interaction of hydro-elastic waves with a vertical wall" by Brocklehurst, P., Korobkin, A.A. & Parau, E.

11:30-11:55 "Numerical Analysis and Validation on Ship Springing" by Kim, Y.H., Kang, B.C. & Kim, Y.

11:55-12:20 "An efficient hydro structure interface for mixed panel-stick hydrodynamic model" by Malenica, S., Sireta, F.X., Bigot, F., Derbanne, Q. & Chen, X.B.

**12.20-14.00: Lunch**

**14.00-15.40: Session 6 "Wave kinematics" - Prof F Dias (Ecole Normal Superieure de Cachan)**

14:00-14:25 "Influence of wind on focusing waves packet using a Boussinesq-type model" by Robin, P., Kimmoun, O. & Kharif, C.

14:25-14:50 "Wave focusing over submerged elliptical topography" by Porter, R. & Griffiths, L.S.

14:50-15:15 "Investigations of Freak Waves on Uniform Current" by Yan, S., Ma, Q.W. & Adcock, T.A.A.

15:15-15:40 "Long Internal solitary waves induced currents in the ocean" by Zhang, H.Q. & Li, J.C.

**15.40-16.10: Coffee Break**

**16.10-17.50: Session 7 "Hydrodynamics with bathymetry" - Prof WC Webster (University of California at Berkeley)**

16:10-16:35 "Multi-block, boundary-fitted solutions for 3D nonlinear wave-structure interaction" by Bingham, H.B., Ducrozet, G. & Engsig-Karup, A.P.

16:35-17:00 "Wave drift forces on a rectangular barge in varying bathymetry" by Liu, Y.N., Molin, B. & Kimmoun, O.

17:00-17:25 "Hybrid finite difference/BEM solutions of the elliptic mild slope equations" by Zadeh, R.N. & Bingham, H.B.

17:25-17:50 "A Note on Three-Dimensional Green-Naghdi Theory" by Zhao, B.B., Duan, W.Y. & Webster, W.C.

**17:55-18:55: Committee meeting**

**19.00-20:30: Dinner**

**Tuesday 11st May 2010**

**8.30-10.10: Session 8 "Green functions" - Prof R Eatock Taylor (Oxford University)**

08:30-08:55 "The two dimensional Green's function in elliptic coordinates" by Chatjigeorgiou, I.K. & Mavrakos, S.A.

08:55-09:20 "A New Algorithm for the Time-domain Green Function" by Dai, Y.Z.

09:20-09:45 "Analytical solution for the capillary-gravity waves due to an oscillating Stokeslet" by Lu, D.Q.

09:45-10:10 "Green function with dissipation and side wall effect in wave tanks" by Qin, H.D., & Shen, J.

**10.10-10.40: Coffee Break**

**10.40-12.20: Session 9 "Sloshing, seakeeping and experiments" - Prof YH Kim (Seoul National University)**

10:40-11:05 "Multimodal method for 2D sloshing in a circular tank" by Faltinsen, O.M. & Timokha, A.

11:05-11:30 "Numerical Simulation Method for a Coupling Motion of Ship and Tank Fluid" by Hashimoto, H. & Sueyoshi, M.

11:30-11:55 "Experiments on a segmented ship model in directional irregular waves" by Rousset, J.M., Ferrant, P. & Alessandrini, B.

11:55-12:20 "Separated Sheet Flows" by Yoon, B.S., & Semenov, Y.A.

**12.20-14.00: Lunch**

**14.00-15.15: Session 10 "Wave diffraction and radiation" – Prof SA Mavrakos (National Technical University of Athens)**

14:00-14:25 "Numerical Study on the Second-Order Radiation/Diffraction of Floating Bodies with/without Forward Speed" by Shao, Y.L. & Faltinsen, O.M.

14:25-14:50 "Radiation Loads Acting On a Horizontal Cylinder Oscillating in Stratified Fluid With An Ice-Cover" by Sturova, I.V.

14:50-15:15 "A coupled Rankine - Green function method applied to the forward-speed seakeeping problem" by Ten, I., & Chen, X.B.

**15.15-15.30: Coffee Break**

**15.30-16.45: Session 11 "Multiple body interactions" – Prof M Kashiwagi (Osaka University)**

15:30-15:55 "Linear Modelling of Wave Device Arrays And Comparison To Experimental and Second Order Models" by Bellew, S. & Stallard, T.

15:55-16:20 "The Effect of Column Shape On Linear Diffraction Effects" by Grice, J.R., Taylor, P.H., Borthwick, A.G.L. & Eatock Taylor, R.

16:20-16:45 "Comparison of Potential Flow and Viscous Fluid Models in Gap Resonance" by Lu, L., Cheng, L., Teng, B. & Sun, L.

**16.45-17.00: Coffee Break**

**17.00-18.40: Session 12 "Retirement of Prof R Eatock Taylor" – Chairman: Prof T Miloh**

17:00-17:25 "Inertia and damping of heaving compound cylinders" by Chau, F.P. & Yeung, R.W.

17:25-17:50 "Study on the higher harmonic waves over a submerged bar" by Teng, B., Chen, L.F., Ning, D.Z. & Bai, W.

17:50-18:15 "Wedge impact on liquid surface through free fall motion in three degrees of freedom" by Xu, G.D., Duan, W.Y., & Wu, G.X.

18:15-18:40 "Steep Wave and Breaking Wave Impact On Offshore Wind Turbine Foundations -- Ringing Revisited" by Zang, J., Taylor, P.H. & Tello, M.

**19.00-20:30: Banquet** - Prof GX Wu (University College London) gives a speech in honour of celebrating the retirement of Prof R Eatock Taylor.

**20:30-21:30: Chinese culture presentations**

**Wednesday 12nd May 2010**

**9.00-10.40: Session 13 "Added-resistance and fluid-structure interaction" – Prof B Molin (Ecole Centrale de Marseille)**

09:00-09:25 "Prediction of Added Resistance by Means of Unsteady Wave-Pattern Analysis" by Kashiwagi, M.

09:25-09:50 "Numerical Analysis on Added Resistance of Ships in Time-domain" by Kim, K.H., Joncquez, S., Kim, Y.H. & Bingham, H.B.

09:50-10:15 "Wave Power Absorbers at Floating Platform" by Khabakhpasheva, T.I. & Korobkin, A.A.

10:15-10:40 "Meshfree simulation of free surface flow and fluid-structure interaction" by Lindberg, O., Bingham, H.B. & Engsig-Karup, A.

**10.40-11.10: Coffee Break**

**11.10-12.25: Session 14 "Hydrodynamics of planning ships" – Chairman: Prof D Evans (University of Bristol)**

11:10-11:35 "Slamming Force on A Planing Hull: Comparison between 3D and 2D Solutions" by Qiu, W., Yang, Q.Y. & Peng, H.

11:35-12:00 "Application of Generalized Functions in Planing Theory" by Makasyeyev, M.V.

12:00-12:25 "Comparisons Between 2D+t Potential Flow Models and 3D Rans for Planing Hull Hydrodynamics" by Iafrati, A. & Broglia, R.

**12.45-14.00: Lunch**

**14.00 Tours or Transfers to the airport**