ARC Research Hub for Offshore Floating Facilities

eNewsletter

April 17, 2019

Welcome from Phil Watson, OFFshore ITRH Director

2019 is off and running!

The Hub will shortly enter its fourth year, and it is shaping up to be very busy. Several of the research streams have important experimental programmes underway or in planning, while we continue to advance our numerical and analytical activities. Congratulations to Zefeng Zhou and Lachlan Astfalck who recently submitted their theses for examination – with others making great progress.

As the Offshore Hub moves into its final years, we are starting to focus on communicating our outcomes, and making them widely available. This includes an increase in the number of publications, focused both on technical outcomes and broader engagement. We are also working to develop more 'webapps' to facilitate easy access to our research, and help with dissemination. As we step through our research programmes, we are working to document the value it represents to industry – with emphasis on our partners, but also considering the wider value.

And of course, we are also thinking about what comes next – perhaps a reincarnation, and a chance to tackle new challenges in the offshore sector. More on this in future updates.

It will be a great year!

As always, we thank you for your support – and welcome your involvement.

Hub News

34th International Workshop on Water Waves and Floating Bodies

Members of the OFFshore Hub recently made a splash at the 34th International Workshop on Water Waves and Floating Bodies (IWWWFB) in Newcastle, New South Wales – the first time this prestigious workshop has been held in Australia.

Chief Investigators Paul Taylor, Wenhua Zhao and Hugh Wolgamot, and Research Fellows Lifen Chen and Ian Milne, were in attendance along with numerous other colleagues from UWA.

The annual meeting brings together engineers and scientists with a particular interest in water waves and their effects on floating and submerged bodies. Emphasis is placed on the participation of younger researchers, interdisciplinary discussion between engineers and scientists, and the presentation of preliminary work prior to publication. Participants will include marine hydrodynamicists, naval architects, offshore and arctic engineers and other scientists and mathematicians, who will discuss current research and practical problems.

OFFshore Hub members presented their work on a variety of topics including: *Gap resonance driven by linear, quadratic and cubic wave excitation, Wave interaction with a shallowly submerged step, Nonlinear wave diffraction and radiation around a ship-shaped FPSO in oblique seas, and Experiments on a barge rolling next to a wall.*

The workshop provides an open forum for both exchanging and collating knowledge. It's proceedings are freely available here where contributions can be found dating back to the workshop's inception in 1986.

World-Class Ocean Engineering Expert Peter Tromans Visits the OFFshore Hub

The OFFshore ITRH is readying itself for the imminent arrival of Prof Peter Tromans, current Chairman of Ocean Wave Engineering Ltd in Oxford, UK.

Prof Tromans has vast ocean engineering experience having worked at Shell for over 20 years in different roles, including as leader of the Response Based Design global team, and the Hydrodynamics group leader. During his time at Shell Prof Tromans originated the NewWave theory and has since generalised the probabilistic approach to a wide range of problems, including FPSO mooring response.

Since 1999, Prof Tromans has been working as an ocean engineering consultant to the oil and gas industry. He is a chartered engineer and fellow of the institution of Mechanical Engineers. For the past 18 years he has also held a visiting professor position at Imperial College, London.

As a consultant, Prof Tromans and his team have taken on a wide range of projects, from reliability analysis, dynamic analysis, and long-term response analysis for all types of fixed and floating offshore structures.

During his visit, Prof Tromans will meet with UWA academics, students and industry partners to discuss various aspects of research underway in the OFFshore ITRH and provide valuable advice on our future direction. In

addition, Prof Tromans will present on “The Response of Offshore Structures in Extreme Environmental Conditions” at Woodside, and on “Extreme waves and responses to a sea state” at UWA.

Prof Tromans’ visit will help the OFFshore ITRH further its research aims and enhance its collaboration within academia and the offshore industry, on both a local and international level. Stay tuned for updates during Prof Tromans’ visit!

Australasian Oil & Gas Exhibition & Conference 2019

Members of the OFFshore ITRH will be out in force at the up-coming 38th Australasian Oil and Gas (AOG) Exhibition & Conference, from March 13th to 15th at the Perth Conventional Centre. The three-day Exhibition and Conference will cover a range of topics centred around the theme ‘An Energy Shift’, highlighting changing trends in the industry such as the rising confidence of the oil and gas market, effective transitioning of projects from construction to operation and maintenance, new uses for liquefied natural gas (LNG), and new energy.

The AOG exhibition space will showcase more than 250 companies and provide a unique opportunity for attendees to meet, network and debate the future role of natural gas and oil. The OFFshore Hub, in conjunction with other UWA entities OceanWorks, Industry Engagement, the ITTC for LNG Futures, the Centre for Long Subsea Tiebacks, the Oceans Institute, the School of Engineering and the Oceans Graduate School, will be on hand to promote their work and engage with fellow attendees.

In addition, members of the OFFshore Hub will actively participate in the Collaboration, Subsea and Knowledge forums, with Chief Investigator Scott Draper presenting at the Technology Showcase on ‘Oceanworks: Innovating to Generate Innovative Ocean Research’, and at the Subsea forum on ‘Best practice scour predictions versus scour survey data for a subsea structure on the North West Shelf’.

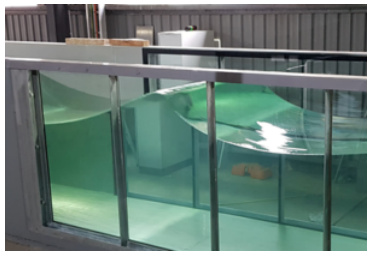
Free entry to the event ensures it will be popular, with over 8,000 global visitors attending last year.

Be sure to stop by the UWA booth in the Exhibition space and say hello!

Making Waves at Shenton Park Field Station

The UWA Shenton Park Field Station wave flume refurbishment project is nearing completion. Once open, the facility will allow researchers to investigate the behaviour of fixed and floating structures when subject to either deep (offshore) or shallow (nearshore) water waves. This facility represents a significant increase in the testing capabilities of the offshore hydrodynamics team which will have a positive impact on research and teaching and allow us to provide further support to local industry.

First cab off the rank will be a test program to support the Greenwater loading project undertaken by the Project 2: Wave Structure Interaction team.



The refurbished Shenton Park wave flume completed essential commissioning works on the paddles supplied by HR Wallingford in late 2018. Video of the associated activities may be viewed here. Supplementary works on the overall facility are currently underway in order to make the wave flume ready for an official opening in early 2019.

Stay tuned for news on the upcoming big splash!

Hub Spotlight

Rasoul Hejazi's work tackles the fundamental dynamic behaviour of large diameter steel catenary riser (SCR) systems under random ocean waves and currents in the North West Shelf (NWS). Rasoul's refined fatigue design procedure for SCRs will enable the use of larger diameter SCRs by moving the touchdown point (TDP) and thereby causing the distribution of fatigue damage over a longer span.

"I've created a realistic coupled motion analysis by combining floating structures and mooring lines with properly estimated TDP motion of SCRs over their lifetime. This, combined with input data from industry partners, provides validation of the numerical analysis results."

The direct impact of refining the SCRs fatigue design procedure, means potential cost savings through the need for less subsea infrastructure, while at the same time allowing for an increase in production through the use of large diameter SCRs.

Rasoul is an active participant in the OFFshore ITRH mentoring program. Incremental publication of Rasoul's research is listed here and for further details, please refer to Rasoul's profile page.

Publications

Interested in learning more about our work? Below is a list of some of our more recent publications. A full list of our publications can be found here. To request a PDF version please contact us.

- Wang, H., Wolgamot, H., Draper, S., Zhao, W., Taylor, P., Cheng, L., Ning, D. (2019) Nonlinear wave diffraction and radiation around a ship-shaped FPSO in oblique seas. Proceedings of the 34th IWWWFB workshop, Newcastle, NSW

- Wang, H., Wolgamot, H., Draper, S., Zhao, W., Taylor, P., Cheng, L. (2019) Resolving wave and laminar boundary layer scales for gap resonance problems. Journal of Fluid Mechanics 866:759-775
- Zhang, X., Draper, S., Wolgamot, H., Zhao, W., Cheng, L. (2019) Eliciting features of 2D greenwater overtopping of a fixed box using modified dam break models. Applied Ocean Research, Volume 84, March 2019, Pages 74-91
- Feng, X., Gourvenec, S., White, D. (2019) Load capacity of caisson anchors exposed to seabed trenching. Ocean Engineering, Volume 171, 2019, pp. 181-192
- Chen, L., Taylor, P., Draper, S., Wolgamot, H. (2019) 3-D numerical modelling of greenwater loading on fixed ship-shaped FPSOs. Journal of Fluids and Structures, Volume 84, January 2019, Pages 283-301

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