ARC Research Hub for Offshore Floating Facilities

eNewsletter

March 19, 2018

Welcome from Phil Watson, OFFshore ITRH Director

Welcome to this inaugural newsletter from the OFFshore Hub, and my first open address since taking on the role as OFFshore Hub Director. It's a great pleasure to be back at The University of Western Australia, where I started my journey within the offshore industry – so much has changed, and yet some constants remain – including the depth of talent within the research team, and the breadth of facilities available to tackle the complex challenges facing both Australian and international projects.

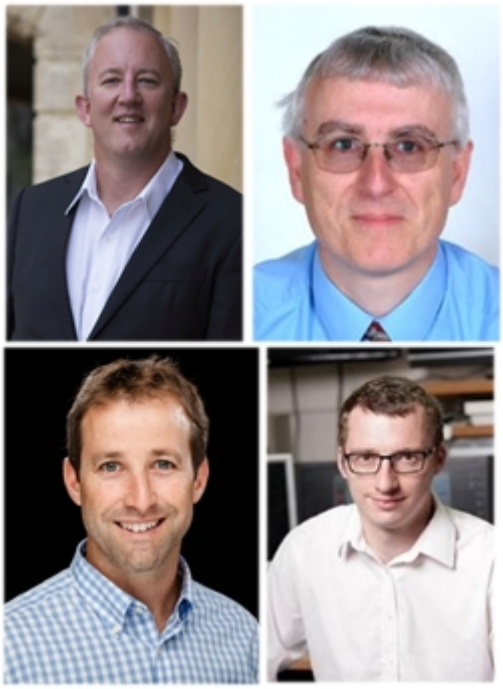
The OFFshore Hub team is a diverse and multi-disciplinary team, delivering applied research outcomes that stretch from below the seafloor to above the sea surface. As we near the end of our second year, it's a particularly busy time. Our five project streams are well established, and working closely with our industry partners to direct the research in a way that will maximise impact. We are seeing early wins from work completed, and there is more to come. Our team is visible, presenting outcomes and leading discussion at major conferences and in industry forums. By mid-2018 we anticipate having the majority of our PhD students on-board, expanding the team to nearly 50 academics and students. We are also building our international network, creating links to the Alan Turing Institute and The University of Southampton in recent months, and welcoming various high profile visitors.

With approval from our Advisory Board, we are working to identify new collaboration opportunities – and are actively speaking with operators, contractors and consultants about how findings from OFFshore Hub activities may enable them to deliver safer, more economic outcomes on upcoming projects. As you read further about our activities and achievements, ask yourself – are we working on challenges relevant to you? If the answer is yes, please contact us – we welcome your engagement.

Hub News

Changes afoot at the OFFshore ITRH

Late last year a number of personnel changes occurred within the ITRH for Offshore Floating Facilities (OFFshore), injecting new excitement into an already energized group of industry focused UWA-based researchers.



Phil Watson was appointed as the new Director of the OFFshore ITRH. Phil joined UWA from Fugro-AG where he was the Global Director of GeoConsulting. Phil was also appointed to the Shell Chair in Offshore Engineering whose overarching aim is to strengthen research and industry collaboration within WA's offshore petroleum industry.

Phil succeeds Professor David White, who has taken up a new position at the University of Southampton. David will retain his involvement with the OFFshore ITRH as a Partner Investigator through strong research links within the various project streams and continued supervision of PhD students.

New Chief Investigators Professor Paul Taylor, Dr James Doherty and Dr Sam Stanier were also appointed. Paul recently joined UWA from Oxford University as the new Chair in Ocean Engineering. Paul is a world renowned researcher in hydrodynamics and bolsters the already impressive line-up in the Project 2: Wave-structure interaction team. James is a senior lecturer at UWA and joins the Project Three: Reliable moorings and risers team to provide additional leadership on the drilling riser fatigue research program. Sam was a recent ARC DECRA grant recipient and moves from the Research Associate role to a Chief Investigator role on the Project Four: Novel anchors and subsea foundation systems stream. Joe Tom will take over the Research Associate role in Project 4 vacated by Sam.

Finally, Professor Susan Gourvenec left UWA to take up a new position at the University of Southampton. Susan will continue to be involved in the Project 4 stream as a Partner Investigator through her ongoing supervision of PhD students.

In 2018 new PhD students will continue to swell the ranks of the OFFshore ITRH and the originally planned cohort will be exceeded.

As we approach our two year anniversary in April 2018, we look forward to continue delivering outputs which generate real impact for our industry partners: Shell, Woodside, Bureau Veritas and Lloyds Register.

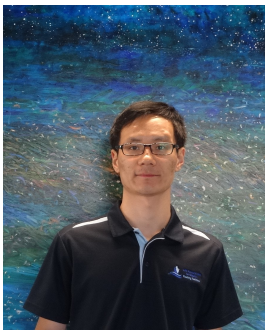
Hydrodynamics specialist Bernard Molin to visit the OFFshore ITRH

During the 2017 Ocean Offshore & Arctic Engineering (OMAE) conference, OFFshore ITRH Chief Investigator Dr Wenhua Zhao invited Prof Bernard Molin from the École Centrale de Marseille, France, to visit UWA. Prof Molin accepted this offer and has recently spent two productive weeks with the Project Two: Wave-Structure interaction team. During his visit, Prof Molin gave a number of lectures at UWA on his recent research efforts into moonpool and gap resonance effects for both academics and members of the local offshore industry.

Prof Molin is a world renowned professor in Offshore Engineering. His recent involvement has included hydrodynamics of offshore structures, vortex induced vibrations, slamming, moon-pool/gap resonance, sloshing in tanks and motion coupling, run-up effects and slow-drift excitation. This research covers most of the key aspects in fluid-structure interaction, which are exactly the emerging needs for the OFFshore ITRH and the offshore industry in Australia. He was named as the 22nd Georg Weinblum Memorial Lecturer (1999-2000) in recognition of his many outstanding contributions to offshore hydrodynamics, and has been the Editor-in-Chief for the high quality offshore engineering journal "Applied Ocean Research". As the most recognized Offshore Hydrodynamic expert in France, his book titled "Hydrodynamics of Offshore Structures" (in French) has been used as the key reference throughout French universities and the offshore industry.

Prof Molin's successful visit has helped the OFFshore ITRH to develop new opportunities for collaboration with European universities and the associated offshore industry. Stay tuned for more news on future OFFshore ITRH work with Prof Molin.

Tuck Fellowship Recipient 2018



PhD student and OFFshore ITRH member Xiantao Zhang has been awarded the prestigious Tuck Fellowship, a travelling fellowship to support participation at international conferences by students and younger researchers. He follows in the footsteps of his PhD supervisor Dr. Hugh Wolgomot, himself a Tuck Fellowship winner in 2015. Xiantao will be heading to France in early April to attend the International Workshop on Water Waves and Floating Bodies (IWWWFB).

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.

Xiantao's research focuses on the physics of greenwater overtopping on offshore vessels with the aim to create a more accurate and efficient approach to predict impact loads on topsides. By analysing the difference between greenwater and dam break flow, important new parameters can be established, allowing for the development of a more accurate and reliable prediction methodology. The direct impact will be improved production efficiency and reduced costs by preserving the offshore structure's integrity and minimising downtime.

For further details on Xiantao's research please check out his profile page.

Conferences

The OFFshore ITRH are getting ready to make a Splash at OTC Asia 2018

Members of the OFFshore ITRH are getting ready for the Offshore Technology Conference (OTC Asia) held at the end of March in Kuala Lumpur, Malaysia.

UWA will have a strong presence at the conference with both the Offshore ITRH and the Australian Centre for LNG Futures (ACLNGF) in attendance. Offshore ITRH director Phil Watson be chairing a session on FLNG and many others will be presenting papers that highlight excellence and innovation through new efficient processes and solutions.

A UWA booth on the convention floor will provide a platform to showcase research and development projects relevant to the offshore energy resources industries and facilitate discussion between universities and industry stakeholders on how these R&D projects can be applied practically.

In addition, UWA will be participating in the University R&D Showcase and Challenge which takes place on the last day of the conference. The challenge will provide universities with the opportunity to share current and planned R&D projects that are relevant to offshore technology and allow them to collaborate with industry professionals to develop innovative ideas to address challenges facing the offshore energy sector.

The team, led by Phil Watson, includes PhD students Todd Bond, Rasoul Hejazi, Terry Griffiths and Andrew Zulberti, together with 4 industry guests, will compete against 11 other universities to brainstorm solutions to the

question ***"How can we make future offshore energy development more cost competitive in the growing global energy market?"*** Winning solutions will be awarded a cash prize to further their research and development activities. Best of luck to the team!

UWA is well received at AOG

The Australian Oil and Gas (AOG) Conference and Convention landed at the Perth Convention Centre from 14-16 March 2018. UWA was out in force at the event, with a stand showcasing many of the members of the Oceans Institute, the OFFshore ITRH and the Australian Centre for LNG Futures.

Members from the UWA research community highlighted their work in the areas of marine science, long subsea tie-backs and all aspects of offshore floating facilities. The stand, located adjacent to the NERA Technology and Skills Hub, also provided information on the new Oceans Graduate School and the upcoming Masters of Ocean Leadership.

At the conference venue, OFFshore ITRH CI Melinda Hodkiewicz co-chaired a panel discussion on ***The workforce of the future*** as part of the Collaboration Forum and OFFshore ITRH Director Phil Watson spoke at the ***Collaborating to gain knowledge*** session. In addition, Oceans Institute members Terry Griffiths and Julian Partridge spoke on ***Subsea decommissioning*** and Myra Keep spoke at the first ***Monitoring and inspection*** session all taking place during the Subsea Forum.

AOG 2018 was deemed a great success with over 200 exhibitors, providing opportunities to network and three days of free-to-attend conference sessions that highlighted the most innovative breakthroughs which will drive the industry into the future.

Riding the Wave at KOZWaves 2018

Professor Paul Taylor, Dr Ian Milne and Dr Hugh Wolgamot of the OFFshore ITRH Wave-structure interaction project stream recently attended **KOZWaves**, the 3rd Australasian Conference on Wave Science, at the Auckland University of Technology from the 12th to 14th of February.

The conference is a forum for contemporary research on wave science, promoting interdisciplinary collaborations between Australasian wave scientists, and international researchers. It focuses on advancing theoretical, numerical and experimental techniques across the different branches of wave science, including acoustics, elasticity, electromagnetics and water waves.

The conference brought together both local and international experts in wave science and had a strong showing from the water wave community. UWA presenters were well received and showcased the latest Hub research, speaking on rough seas, the application of numerically-derived ocean wave spectra and nonlinear waves in narrow gaps.

Potential collaborations between the OFFshore ITRH and The University of Melbourne were explored, looking at how to combine our collective expertise in wave modelling and hydrodynamics. Watch this space.

PhD Student Spotlight

Dunja Stanisic is one of the PhD students in the Project 3: Reliable Moorings and Risers project stream. Dunja's research explores mooring systems, looking at extreme loads in the mooring lines of offshore floating facilities. Extreme mooring loads are difficult to predict due to the randomness of the environment (waves, wind and current) and the complexities of predicting vessel motion. Current industry practice relies on numerous simulations and lengthy calculations.

"My research aims to develop a reliable, time efficient method for obtaining extreme mooring loads with less computational effort. The first step is to gain an understanding of the current design practice and the validity it achieves. From there new methodology can be established, which reduces the number of simulations required for each load case by at least a third to attain a level of accuracy consistent with current industry practice."

Implementation of this new methodology to explore the reliability of both the mooring chains for offshore floating facilities, and the piles to which the mooring chains are attached, will assist industry partners to design safer structures more efficiently, reducing costs and improving structural longevity.

Dunja is an active participant in the OFFshore ITRH mentoring program. Incremental publication of Dunja's research is listed here, and further details are available on Dunja's profile page.

Publications

To stay up-to-date on publications derived from, and related to, the OFFshore ITRH research program please click here

- Hejazi, R. (2018) An Ann based Approach for Rapid Stochastic Fatigue Assessment of Large Diameter SCR. Offshore Technology Conference (OTC) Asia 2018. Kuala Lumpur, Malaysia 28397
- Chen, L., Draper, S., Wolgamot, H., Cheng, L. (2018) Green Water Evaluation for FPSOs during Cyclones, Offshore Technology Conference (OTC) Asia 2018. Kuala Lumpur, Malaysia 28538
- Zed, M., Milne, I. (2018) Full-Scale Verification of the Hydrodynamic Motions of a Floating Facility, Offshore Technology Conference (OTC) Asia 2018. Kuala Lumpur, Malaysia 28479
- Milne, I., Zed, M. (2018) Deriving Directional Wave Spectra from Ship Motions. Offshore Technology Conference (OTC) Asia 2018. Kuala Lumpur, Malaysia 28452
- Zhou, Z., White, D.J., O'Loughlin, C. (2018) An effective stress framework for estimating penetration resistance accounting for changes in soil strength from maintained load, remoulding and reconsolidation, Géotechnique **ISSN** 0016-8505 | **E-ISSN** 1751-7656
- Rayson, M.D., Ivey, G.N., Jones, N.L., Fringer, O.B. (2018) Resolving high-frequency internal waves generated at an isolated coral atoll using an unstructured grid ocean model, Ocean Modelling, Vol 122, 67-84 DOI10.1016/j.ocemod.2017.12.007

- Zhang, X., Wolgamot, H., Draper, S., Zhao, W., Cheng, L. (2018) The Role of Overtopping Duration in Greenwater Loading, Proceedings of the 33rd International Workshop on Water Waves and Floating Bodies (IWWWFB), Guidel-Plages, France
- O'Loughlin, C., White, D.J., Stanier, S.A. (2017) Plate Anchors for Mooring Floating Facilities – A View Towards Unlocking Cost and Risk Benefits, Proceedings of the 8th International Conference on Offshore Site Investigation and Geotechnics (OSIG), London, UK
- Gourvenec, S., Stanier, S.A., White, D.J., Morgan, M., Banimahd, M., Chen, J. (2017) Whole-Life Assessment of Subsea Shallow Foundation Capacity, Proceedings of the 8th International Conference on Offshore Site Investigation and Geotechnics (OSIG), London, UK
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- Hongchao, W., Draper, S., Zhao, W., Wolgamot, H., Cheng, L. (2017) Development of a CFD Model to Simulate Three-Dimensional Gap Resonance Applicable to FLNG Side-by-Side Offloading, International Conference on Ocean, Offshore & Arctic Engineering, Trondhiem, Norway OMAE2017-61673
- Zhao, W., Pan, Z., Taylor, P.H., Efthymiou, M. (2017) **Estimation of Gap Resonance Relevant to Side by Side Offloading,** International Conference on Ocean, Offshore & Arctic Engineering, Trondhiem, Norway OMAE2017-61342
- Stanisic, D., Efthymiou, M., Kimiaei, M., Zhao, W. (2017) Evaluation of Conventional Methods of Establishing Extreme Mooring Design Loads, International Conference on Ocean, Offshore & Arctic Engineering, Trondhiem, Norway OMAE2017-61243
- Zhou, Z., White, D.J., O'Loughlin C. (2017) Predicting the Change in Soil Response for Vertical Pipe-Seabed Interaction Accounting for Remoulding, Reconsolidation and Maintained Load , International Conference on Ocean, Offshore & Arctic Engineering, Trondhiem, Norway OMAE2017-61695
- Tom, J., Draper, S. (2016) Flow Between a Plane Wall and an Oscillating Circular Cylinder in Still Water at Low KC and Reynolds Number. Proceedings of the 20th Australasian Fluid Mechanics Conference (AFMC), Perth, WA
- Zhang, X., Draper, S., Wolgamot, H., Zhao, W., Cheng, L. (2016) Numerical Investigation of Green Water for a Two Dimensional Fixed Rectangular Structure. Proceedings of the 20th Australasian Fluid Mechanics Conference (AFMC), Perth, WA
- Astfalck, L.C., Hodkiewicz, M.J., Keating, A., Cripps, E.J., Pecht, M. (2016) A modelling ecosystem for prognostics. Annual Conference of the Prognostics and Health Management Society, Denver, Colarado
- Zhao, W., Wolgamot, H., Draper S., Taylor P.H., Eatock Taylor R., Efthymiou M. (2016) Experimental determination of resonant response in the narrow gap between two side-by-side fixed bodies in deep water. International Conference on Ocean, Offshore & Arctic Engineering, Busan, Korea OMAE2016-54797
- Bertolacci, M., Cripps, E., Cripps, S., Lau, J. (2016) Bayesian mixture models for multivariate time series with an application to Australian rainfall data. Neural Information Processing Systems (NIPS) Time Series Workshop, Barcelona, Spain
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