ARC Research Hub for Offshore Floating Facilities

eNewsletter

May 04, 2020

## Welcome from Phil Watson, OFFshore ITRH Director

***Staying productive in challenging times!***

Since publishing our last newsletter much has changed in the world. Recent times have been dominated by the COVID-19 pandemic. While Australia appears, for now at least, to have avoided a major health crisis our thoughts and well wishes are with our international colleagues who in some cases are experiencing significantly more difficult times. Aside from the health crisis, no country will be spared a level of economic fallout which may have an even longer lasting impact. As many have said we will get through this – and in some ways may even be stronger for it.

The OFFshore Hub team is striving to stay productive and maintain momentum. Some of our team members are unable to be in Australia due to international travel restrictions and we are engaging with them to provide support and to keep the research effort going. For those in Australia, communication through virtual means continues and individual projects are making good progress. While it is easy to be distracted right now it's important to appreciate that we have moved into Year 5 of the OFFshore Hub – which in many ways is our most important. Now is the time to translate research outcomes into industry impact, to increase engagement with both immediate stakeholders and the wider industry, and to ensure that there is a lasting legacy from our combined efforts. The next 12 months promises to be exciting.

**Looking back over the last few months, it's worth highlighting a couple of milestones:**

- The ARC undertook a review of the OFFshore Hub in late 2019, which included interviews with researchers and industry stakeholders. We recently received feedback from the ARC who concluded "*The Research Hub has satisfactorily met the objectives of the ARC Industrial Transformation Research Program and its own previously stated aims and objectives*" – which is a great outcome. We received a number of recommendations which we are working through now, some will be actioned immediately while others will positively inform how we move ahead with similar projects in future. Thanks to everyone who assisted with the review process.
- We submitted our ARC bid for a new Research Hub titled '**T**ransforming energy **I**nfrastructure through **D**igital **E**ngineering' (**TIDE**). The project aligns with an industry increasingly focused on operations and will considers both floating facilities and subsea infrastructure. Specifically, the new Hub will transform offshore operations by combining physics based modelling with recorded data from existing and upcoming projects to assess and improve installation practices, create opportunities for more efficient operations and optimised maintenance programmes, and enable life extension activities. It will also use observations to identify cost savings in the design of future infrastructure. As part of the bid significant commitments were made by a range of industry partners, alongside major contributions from UWA, the University of Wollongong, and an experienced high profile team of international researchers. We have received and responded to peer review comments on the submission and now wait the decision of the ARC.

***Stay safe and be mindful of your mental health. Now more than ever don't hesitate in reaching out to discuss any aspect of the OFFshore Hub research programme – or just to touch base and share your experiences in this challenging time.***

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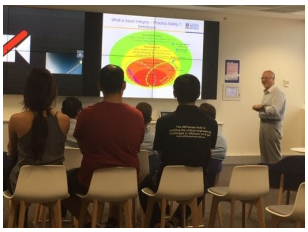
## Hub News

### Asset Integrity for an Offshore Oil & Gas Installation and Structural Reliability Assessment

As part of the OFFshore ITRH training initiative, OFFshore ITRH member and Professor of Offshore Structures at UWA, Mike Efthymiou, provided the first training for 2020 on **Asset Integrity for an Offshore Oil & Gas Installation and Structural Reliability Assessment**.



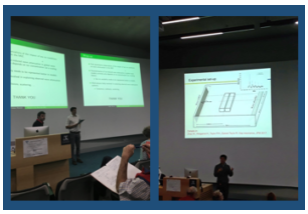
With over 30 years of experience at Shell in a range of roles, Mike provided insight into the rigorous Hazard and Effect Management Process (HEMP) and discussed how establishing asset integrity often goes hand-in-hand with satisfying Engineering Standards, and sometimes requires additional, complementary measures or specifications.

With the development and submission of a Safety Case being a common requirement by Government around the world, Mike discussed the necessity to demonstrate that hazards to health and safety have been identified, that risks have been quantified, and that they are being effectively managed.

The event was well attended with PhD students, academics and members from industry engaging in this crucial topic.

**Stay tuned for future sessions!**

## OFFshore ITRH at KOZWaves 2020



OFFshore ITRH members Wenhua Zhao, Hugh Wolgamot and David Skene recently attended KOZWaves 2020 at the University of Melbourne. The conference spanned three days and provided a forum for contemporary research on wave science, promoting interdisciplinary collaborations between Australasian wave scientists and international researchers. A broad range of topics, covering theoretical and experimental aspects of wave propagation, were discussed in technical sessions and by keynote lectures.

All three Hub members presented at the conference: Wenhua, as an invited speaker, spoke on *Large run-up due to tertiary wave-structure interactions in random seas*, Hugh on *Experimental observation of rainbow trapping in water waves* and David *on the causality and predictability of surface gravity waves with applications for offshore structures.*

The well attended conference focuses on advancing mathematical, numerical and experimental techniques across the different branches of wave science, including acoustics, applied mathematics, ecology, elasticity, electromagnetics, gravitation, optics, seismology, and water waves among others.

## OFFshore ITRH Awarded Access to High Performance Computing Facilities

The OFFshore ITRH has been awarded over 15 million core hours under the 2020 Pawsey supercomputer allocation scheme in order to undertake analysis for the project "Optimising the design and operation of offshore oil and gas facilities using numerical modelling". The project aims at developing new knowledge and technologies that will improve the design and operation of Australian oil and gas extraction and transportation systems through the use of Computational Fluid Dynamics. Without access to Pawsey Supercomputing Facility this ground breaking work could not be achieved.

The project team includes OFFshore ITRH members Liang Cheng (Lead CI), Lifen Chen (Delegated lead CI), Andrew Grime (CI) and Hugh Wolgamot (CI). The hours awarded are a significant increase from last year's core allotment and are noteworthy as the application field was highly competitive.

An additional 0.5 million core hours have also been awarded through the National Computational Merit Allocation Scheme (NCMAS) 2020 to support these works.

**Congratulations to everyone involved!**

## Resources Technology Showcase 2019

In late 2019, members of the OFFshore Hub attended the Resources Technology Showcase (RTS2019) at the Perth Convention and Exhibition Centre. This international event brought together executives from the fields of hard rock mining and oil and gas in order to discuss how technology is reshaping their operations.

This unprecedented gathering of mining and energy executives provided insight into how artificial intelligence, augmented reality, data analytics and autonomous transport which will change the industry in the near future. In addition, public policy experts, academics, senior public servants, industry regulators and influential politicians from WA and Australia were in attendance.

Spanning two days, the showcase included keynote speakers, panel discussions and an Innovation Showcase. Keynote speaker Zoe Yujnovich, Chairman of Shell Australia, cited the OFFshore ITRH as a positive example of how collaborative research could be used to improve offshore safety – in this case through the provision of an improved understanding of the seas around the Prelude FLNG facility off northern WA.

**Further information on the proceedings of RTS2019 can be found** here

### Dr Hugh Wolgamot, ARC DECRA Recipient

Australian Government
Australian Research Council

Congratulations to OFFshore ITRH Chief Investigator Hugh Wolgamot who was recently awarded an ARC Discovery Early Career Researcher Award (DECRA) to develop the use of design waves for establishing safer and more efficient offshore systems.

The DECRA scheme provides focused research support for early career researchers in both teaching and research, and research-only positions. Hugh was one of a select 197 chosen for the DECRA award this year out of a highly competitive field of 1162 applications.

Over the next three years, Hugh's project will overcome a fundamental issue at the heart of ocean engineering design, impacting both offshore renewables and conventional offshore industries.

As Hugh describes, "ocean waves are random, yet the best design tools for wave-structure interaction (model testing and computational fluid dynamics) require short, precisely-defined wave sequences. The outcomes of this work will reduce uncertainty and improve design and safety for facilities such as wind farms and gas platforms."

For further details on all of the recent UWA DECRA researcher recipients please click here.

**Well done Hugh!**

### Melinda Hodkiewicz Elected a Fellow of the Australian Academy of Technology and Engineering

Congratulations go out to OFFshore ITRH Chief Investigator Melinda Hodkiewicz, who is a newly appointed Fellow of the Australian Academy of Technology and Engineering (ATSE). Melinda is one of 25 recently appointed experts chosen from across the research, government and industry sectors.

Hailed as an *Asset management thought leader,* Melinda was chosen for being instrumental in developing and implementing best practice methods in asset management, both nationally and internationally.

As a fierce collaborator working at the nexus of industry and research, Melinda is highly sought after for her technical expertise. By establishing multidisciplinary teams, she has broken new ground in understanding human, organisational and technology factors that affect asset maintenance and safety.

ATSE brings together Australia's leading experts in applied science, technology and engineering to provide impartial, practical and evidence-based advice to enable Australia to maintain its position as a leading technology economy.

Melinda will be formally welcomed into the Academy at the Annual General Meeting in Melbourne on the 29th of November.

Further details are available here.

**Well done Melinda!**

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## Hub Spotlight

William Edge is one of the PhD students in the Project 1: Metocean hazards from solitons project stream. His research focuses on clarifying the sediment suspension and transport processes under non-linear internal wave forcing on the North West Shelf (NWS). By analysing the OFFshore Hub's unique field data from the NWS, William

will be able to quantify and parameterise sediment fluxes with the aim of improving confidence in subsea foundation design and near-seabed visibility predictions for ROV inspections.

**“I am using the dataset to investigate the mechanisms for sediment suspension on the continental shelf and plan to use numerical models to investigate the spatial variability of these effects so that erosion and near-bed visibility can be more accurately predicted.”**

The ability to predict conditions near the sea bed will allow designers to more confidently accommodate erosion, provide more accurate estimates of maintenance intervals, and assist with planning targeted expeditions during favourable conditions.

**William is an active participant in the OFFshore ITRH mentoring program and for further details of his research, please refer to his profile page.**

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## 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.**

- Gao, Z., Efthymiou, M., Cheng, L., Zhou, T., Minguez, M., Zhao, W. (2020) Hydrodynamic damping of a circular cylinder at low KC: Experiments and an associated model. Marine Structures Volume 72, July 2020, 102777
- Zhou, Z., O'Loughlin, C., White, D.(2020) An effective stress analysis for predicting the evolution of SCR–seabed stiffness accounting for consolidation. Géotechnique 70, No. 5, 448–467
- Zhou, Z., White, D., O'Loughlin, C. (2020) The changing strength of carbonate silt: Parallel penetrometer and foundation tests with cyclic loading and reconsolidation periods. Canadian Geotechnical Journal, January 2020
- Zhao, W., Taylor, P., Wolgamot, H., Molin, B., Eatock Taylor, R. (2020) Group dynamics and wave resonances in a narrow gap: modes and reduced group velocity. Journal of Fluid Mechanics, Access Volume 88325 January 2020 , A22
- Tian, Y., Cassidy, M., Liu, W. (2019) Optimising the dimensions of Suction Embedded Anchors by investigating the opening mechanism. Ocean Engineering, Volume 183, 1 July 2019, Pages 350-358
- Ten, I., Chen, L., Taylor, P.H., Wolgamot, H., De Hauteclocque, G. (2019) Greenwater assessment: 2nd order wave run-up and validation of a new method. Proceedings of the 14th International Conference on Hydrodynamics, Rome, Italy
- Zhou, Z., O'Loughlin, C., White, D., Stanier, S.(2019) Improvements in plate anchor capacity due to cyclic and maintained loads combined with consolidation. Géotechnique ISSN 0016-8505 | E-ISSN 1751-7656

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