

Novel Composite Riser Development for Offshore Deep Water Applications

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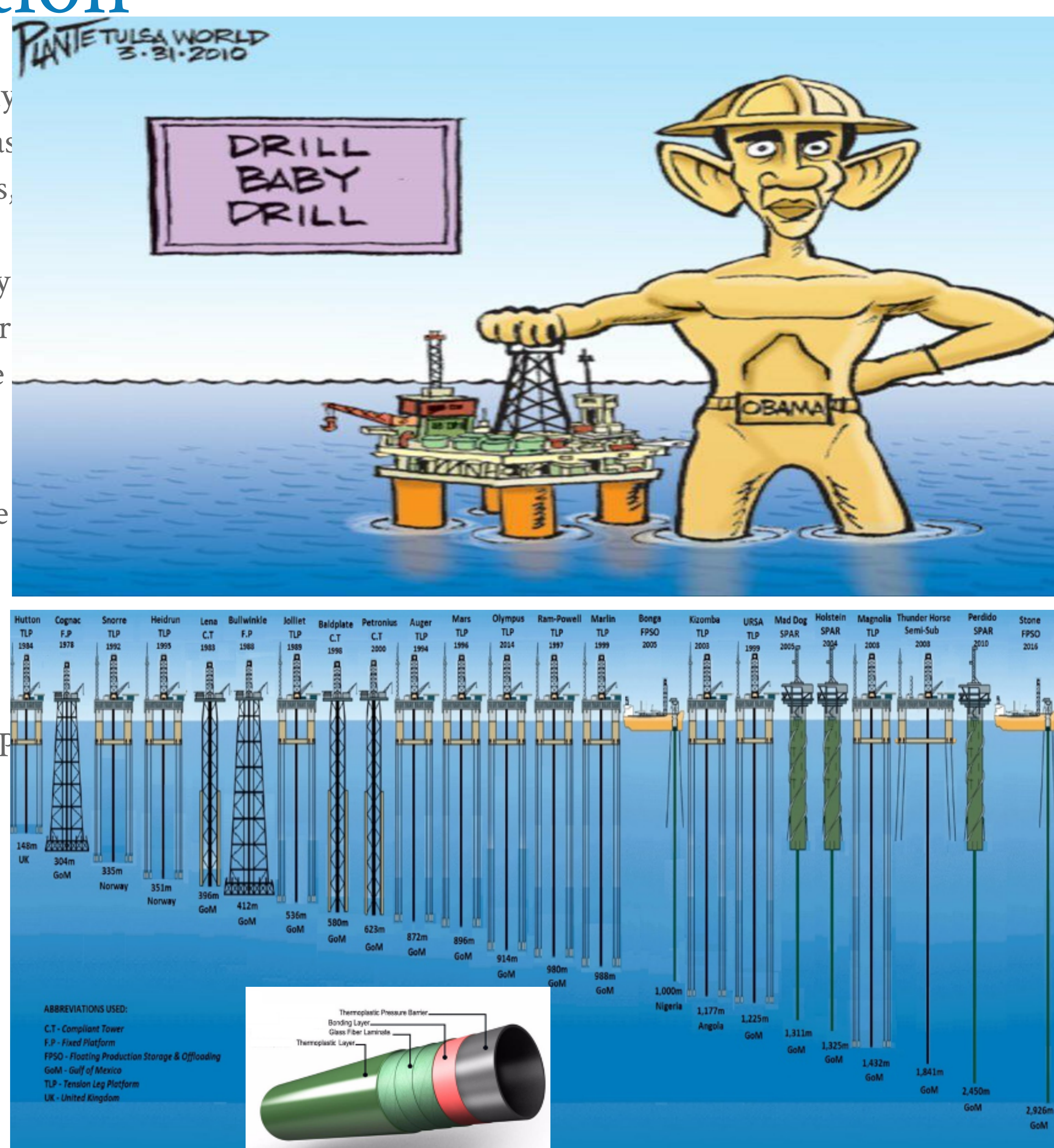
2019 FST ANNUAL (CHRISTMAS) CONFERENCE

@Lancaster University Management School LUMS,

Date: 17th December, 2019

1 Introduction

The use of pipes in oil explorations dates back to early Chinese using bamboo sticks as conduits to transport oil. Thus, the study on Composite Marine riser behaviour is very important. Structures in water behave differently from those structures not in water. Composite materials offer a range of benefits that could be harnessed to improve riser technology. Although composite risers were first deployed in deep waters in 2002 in the UK on Hulton TLP platform as a composite riser joint, there are still some challenges, e.g. standards.



2 Method & Configurations

Types of Risers

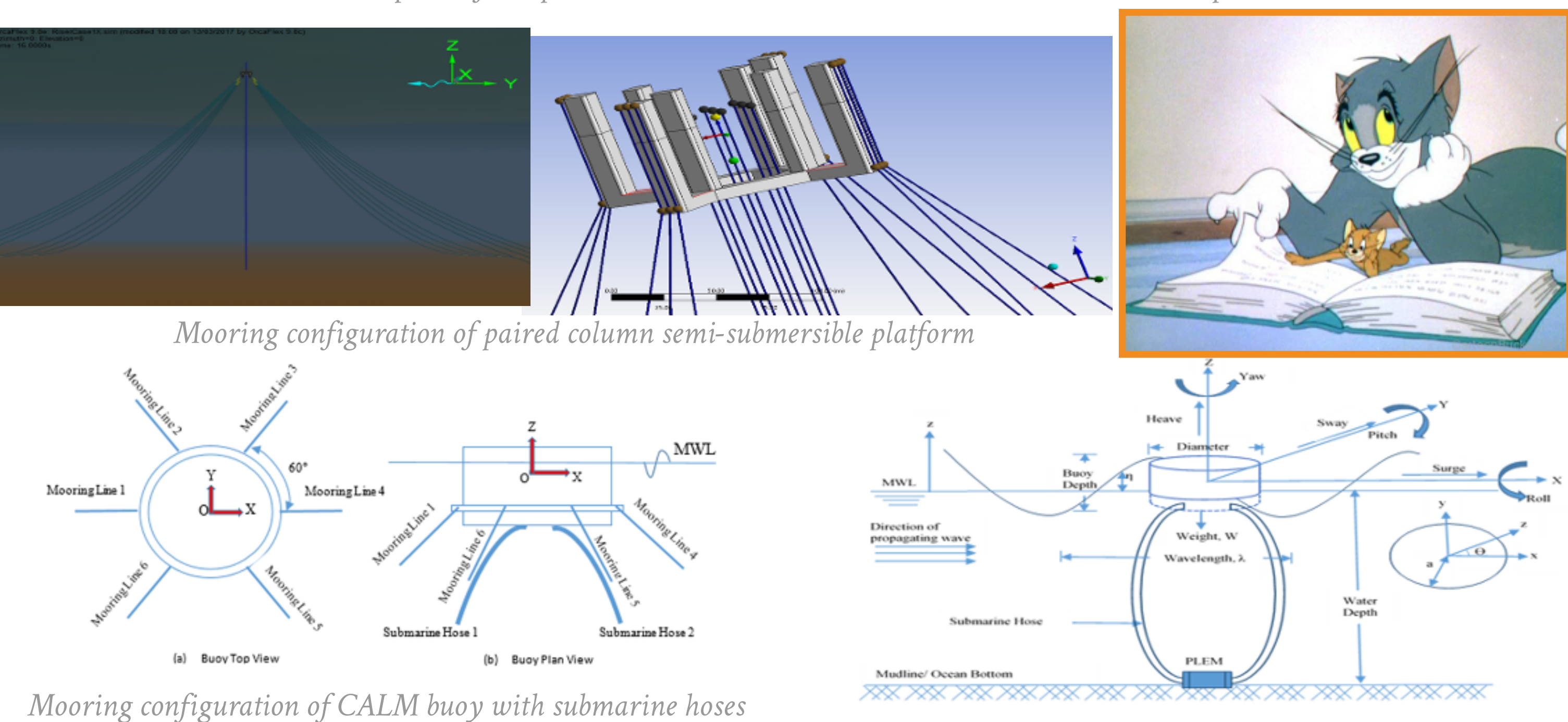
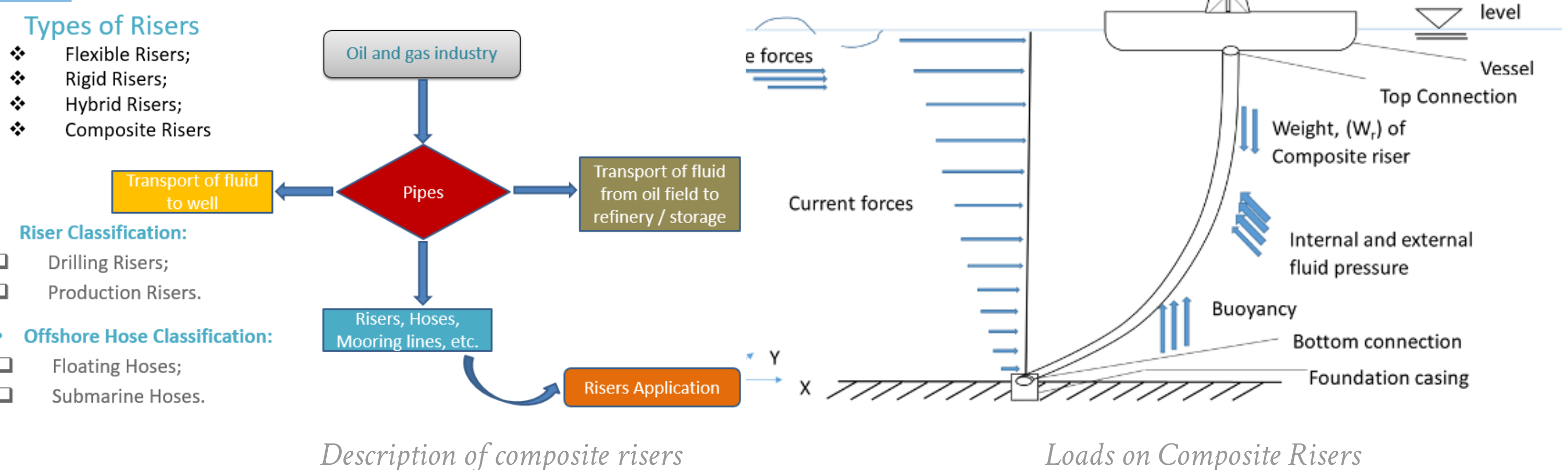
- Flexible Risers;
- Rigid Risers;
- Hybrid Risers;
- Composite Risers;

Riser Classification:

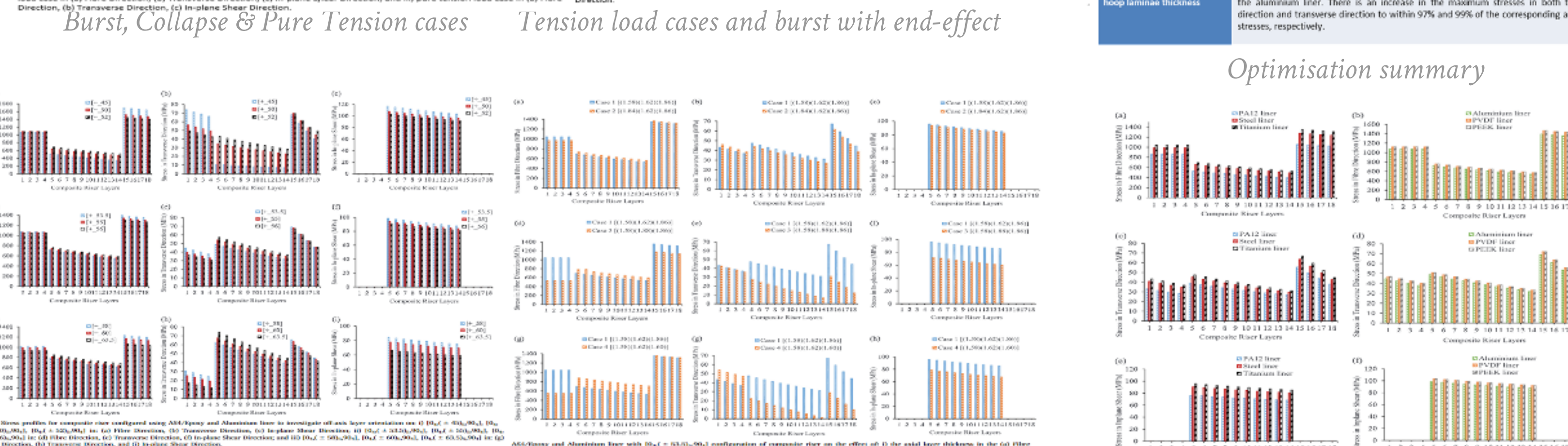
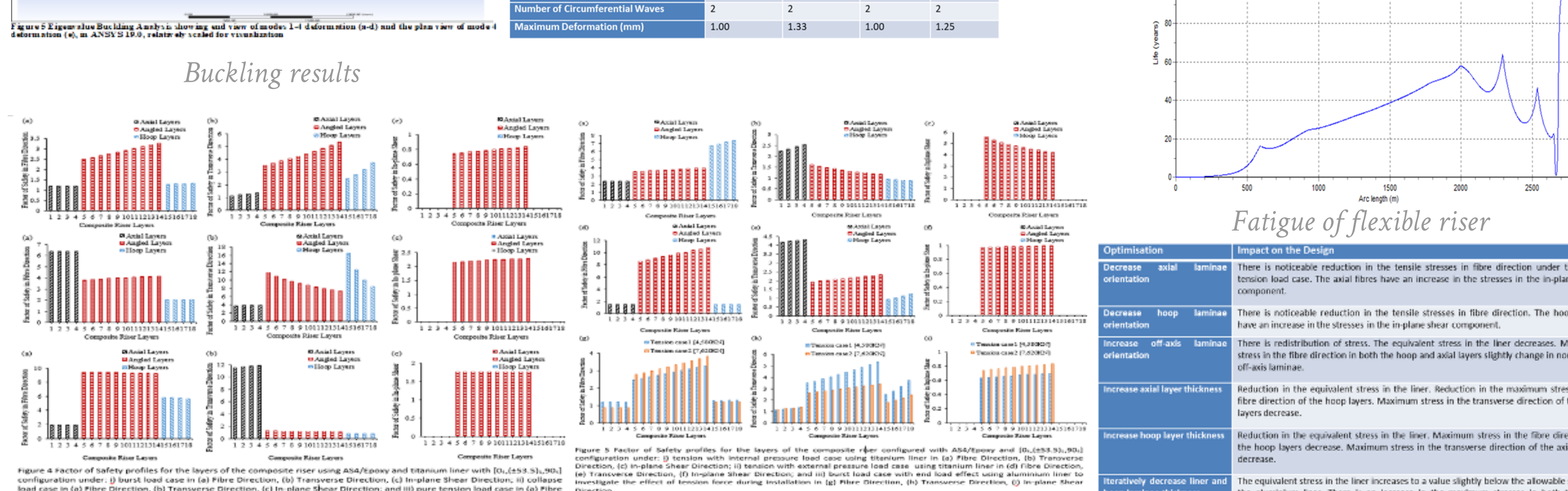
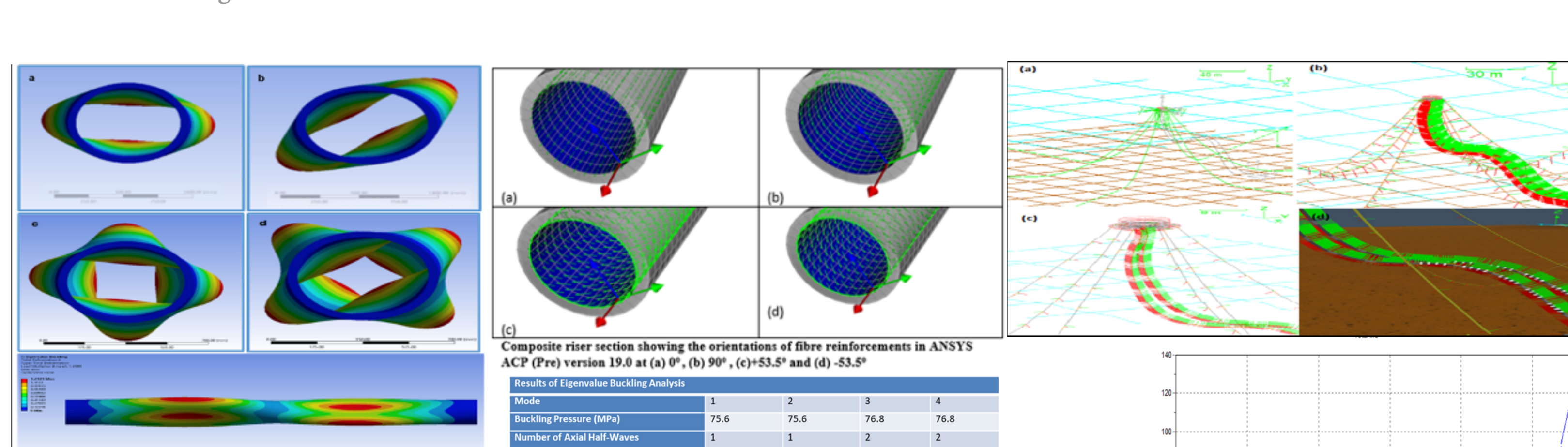
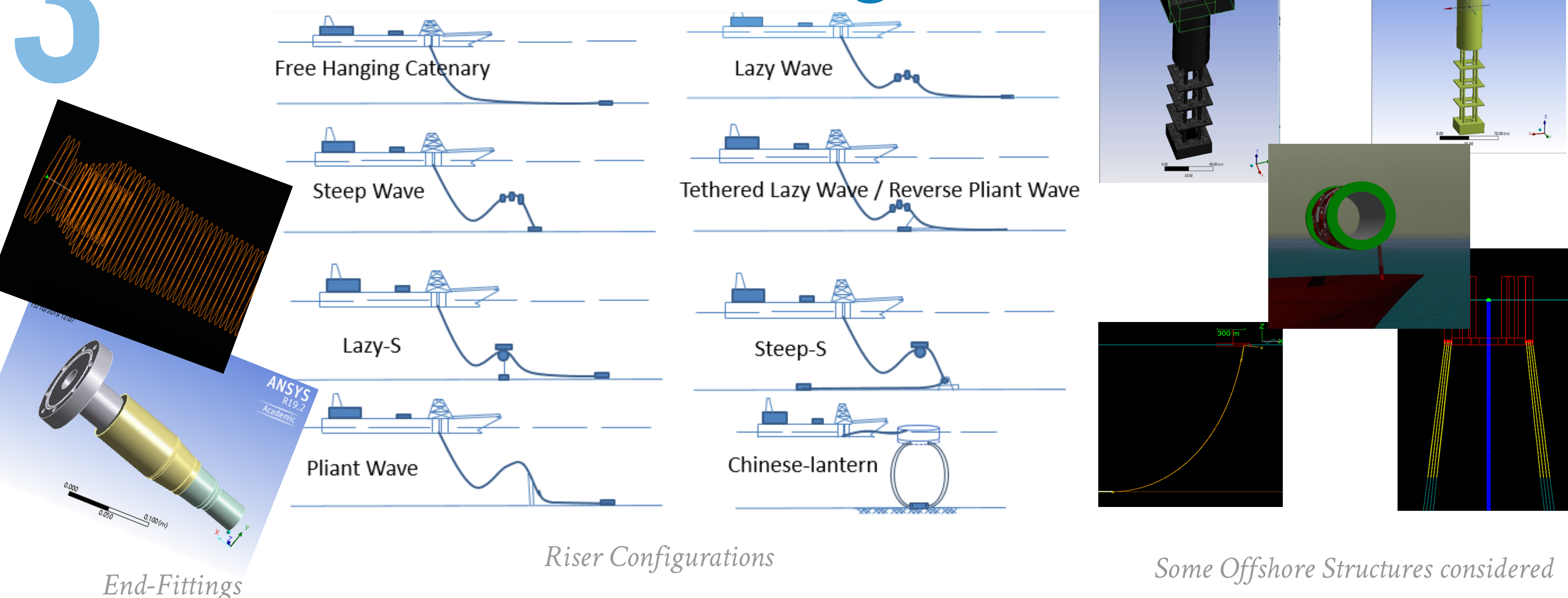
- Drilling Risers;
- Production Risers;

Offshore Hose Classification:

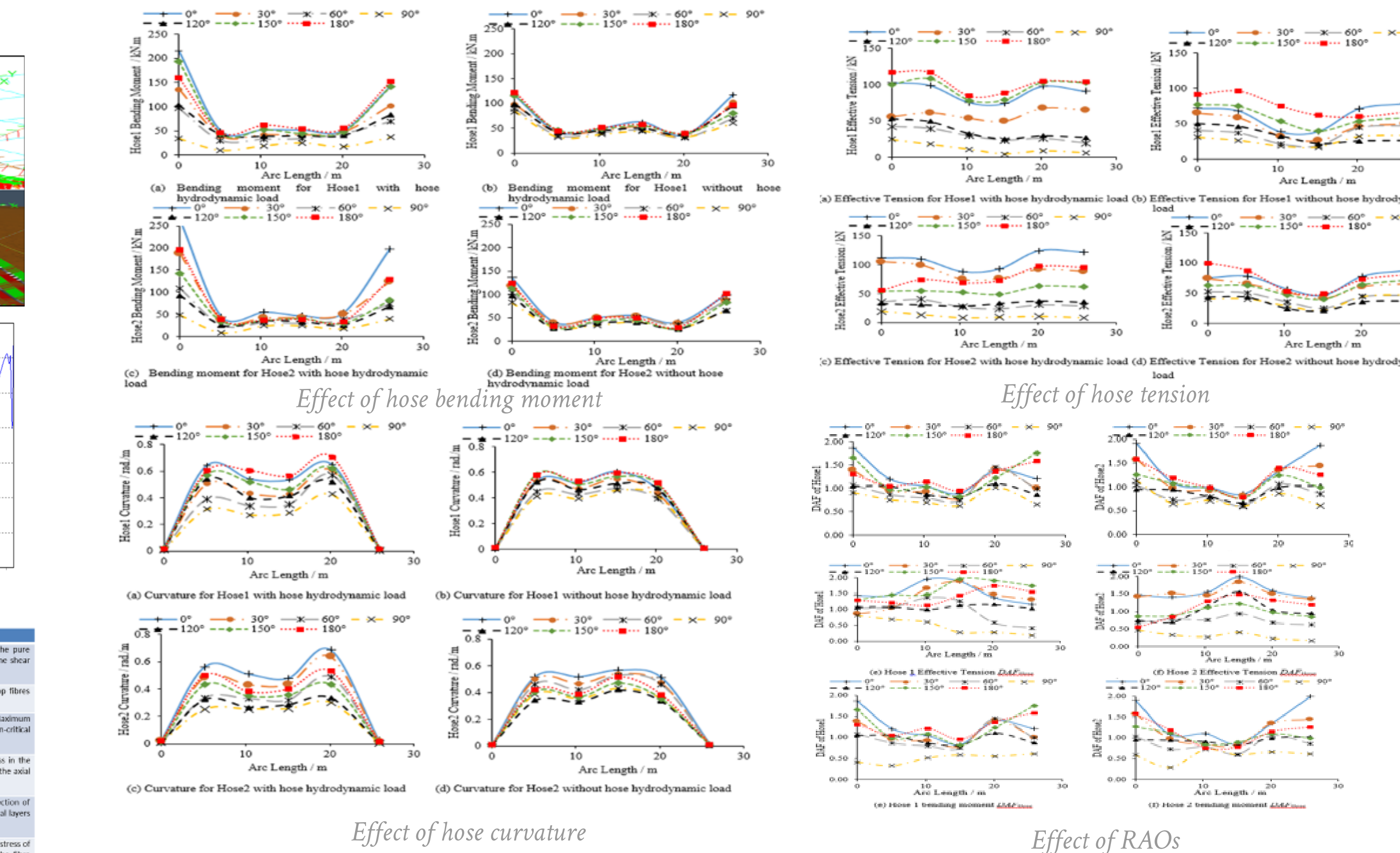
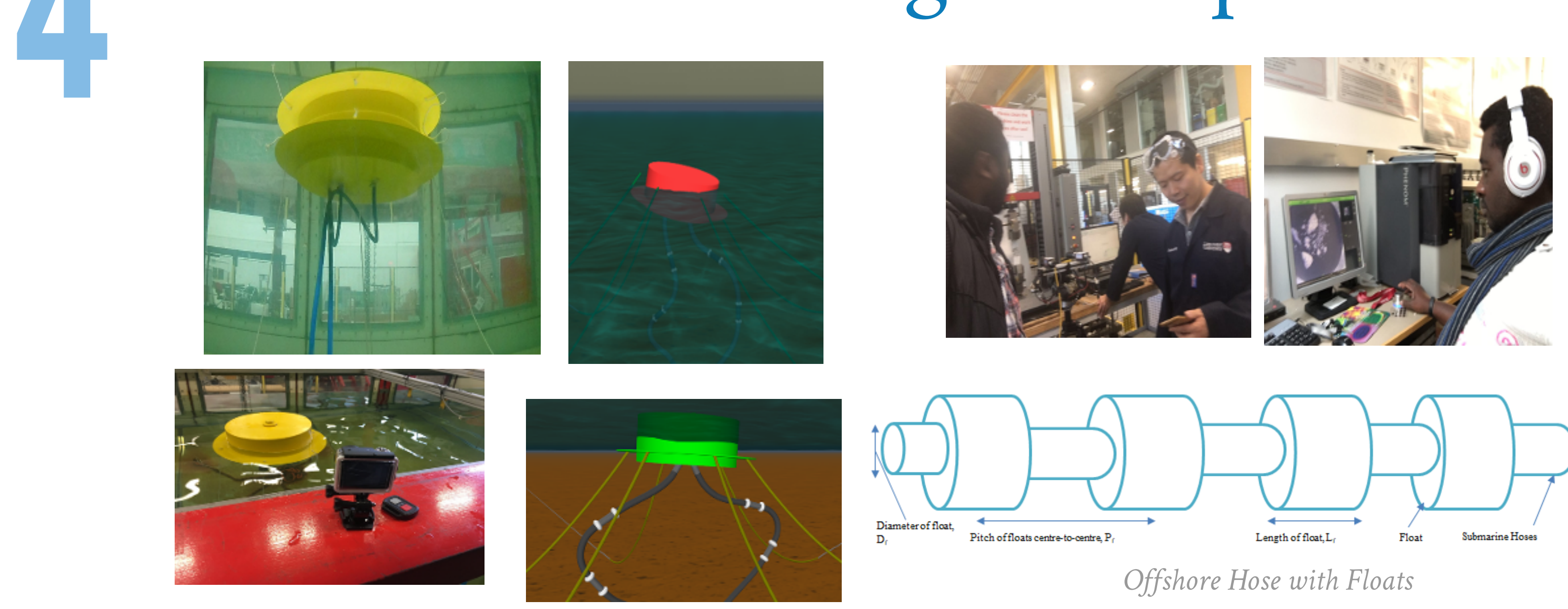
- Floating Hoses;
- Submarine Hoses.



3 Results: Local Design



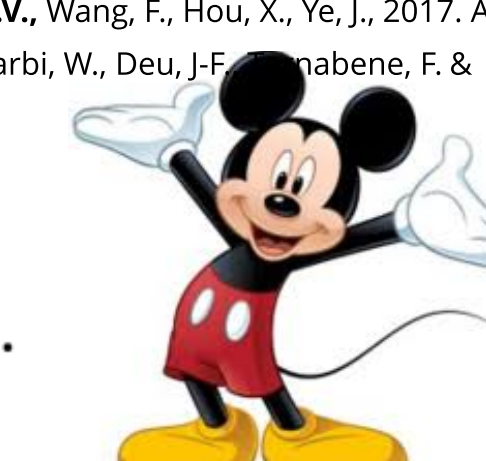
4 Results: Global Design & Experiment



5 Conclusion & Publications

• Amaechi, C.V., Gillett, N., Odjie, A.C., Hou, X., Ye, J., 2019. Composite risers for deep waters using a numerical modelling approach. *Composite Structures*, 210, pp.486-499. <https://doi.org/10.1016/j.compstruct.2018.11.057> ; • Amaechi, C.V., Wang, F., Hou, X., Ye, J., 2019. Strength of submarine hoses in Chinese-lantern configuration from hydrodynamic loads on CALM buoy. *Ocean Engineering*, 171, pp.429-442. <https://doi.org/10.1016/j.oceaneng.2018.11.010> ; • Amaechi, C.V., Odjie, A.C., Sotayo A., Wang, F., Hou, X., Ye, J., 2019. Recycling of Renewable Composite Materials in the Offshore Industry. *Encyclopedia of Renewable and Sustainable Materials; Reference Module in Materials Science and Materials Engineering*. <https://doi.org/10.1016/B978-0-12-803581-8.11445-6> ; • Amaechi, C.V., Odjie, A.C., Etim O., Ye, J., 2019. Economic Aspects of Fiber Reinforced Polymer Composite Recycling. *Encyclopedia of Renewable and Sustainable Materials; Reference Module in Materials Science and Materials Engineering* <https://doi.org/10.1016/B978-0-12-803581-8.10738-6> ; • Amaechi, C.V., Wang, F., Hou, X., Ye, J., 2019. Sensitivity studies on offshore hoses on CALM buoy with comparisons for Chinese-lantern and Lazy-S configuration. *ASME 2019 OMAE 38th International Conference on Ocean, Offshore & Arctic Engineering, Glasgow, UK Jun 9-14, 2019*. Paper Number OMAE2019-96755 ; • Amaechi, C.V., Gillett, N., Odjie, A.C., Wang, F., Hou, X., Ye, J., 2019. Local and Global Design of composite risers on Truss SPAR platform in deep waters. *5th International Conference on Mechanics of Composites, Lisbon, Portugal, July 1-4, 2019*. Paper Number 20005 ; • Amaechi, C.V., Wang, F., Hou, X., Ye, J., 2017. A numerical modelling approach of composite risers for deep waters. *ICCS20 20th International Conference on Composite Structures, Paris, France*. Ferreira, A.J.M., Larbi, W., Deu, J.F., Gabene, F. & Fantuzzi, N. (eds), Societa Editrice Esculapio, p. 262-263 (published in *Structural and Computational Mechanics Book Series*).

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• Special thanks to the staff and members of the Engineering Department.



Optimisation case 1 Optimisation case 2 Design using different liners



Lancaster
University



FST Annual Conference

Citizen Science

with special guest speaker
BBC's Professor Chris Lintott

Tuesday 17th December

9.15am-4.30pm

Management School Hub and LT1

Staff talks, PhD student presentations, poster competition

lancaster.ac.uk/scitech-conference/ #FSTconf

FST Annual Conference 2019

Citizen Science

Agenda

Time	Speaker
9:15am-9:20am	Welcome Professor Malcolm Joyce
9:20am-10:35am	Department Talks <ul style="list-style-type: none"> • Professor Alastair Martin (Engineering) • Dr Calum Hartley (Psychology) • Professor David Middleton (Chemistry)
10:35am-11:00am	Break
11:00am-12:00pm	PhD Talks Dean's Award for PhD Excellence
12:00pm-1:15pm	Lunch
1:15pm-2:15pm	Guest Speaker Professor Chris Lintott
2:15pm-2:30pm	Break
2:30pm-4:10pm	Department Talks <ul style="list-style-type: none"> • James Devine (SCC) • Dr Simon Lunagomez (Maths & Statistics) • Dr Alex Bush (LEC) • Dr Brooke Simmons (Physics)
4:10pm-4:30pm	Prize Giving and Close Professor Pete Atkinson, Dean

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FST Annual Conference 2019: Poster submissions

03/12/2019

Name	Department	Title	Orientation
Ahmad Almutlg	Physics	Constructive Quantum Interference in Anthracene Core	Landscape
Armin Yousefi Kanani	Engineering	The comparison of different dissimilar adhesively bonded joint configuration under tensile loading	Landscape
Chiamaka Emilia Mbanusi	Engineering	Why Oscillations in Experimental Result to Evaluate Dynamic Fracture Toughness?	Landscape
Christina Bremner	School of Computing and Communications	Can my smart office help save the planet?	Landscape
Daniel Turner	Engineering	Facility for the Characterization of Planar Multilayer Thin Film Superconductors	Landscape
David O'Ryan	Observational Astrophysics	Painting Galaxies: Applying Colour Magnitudes to Galactic Mergers	Landscape
Emad Ebad	SCC	Does the Indoor Positioning System (IPS) will become ubiquitous like GPS?	Landscape
Farid Bello	Computing and Communications	A Recommender System's approach based on Empirical Fuzzy Sets	Landscape
Felicity O'Connell	Psychology	Intending on lying	Landscape
Freya Olsson	LEC	Investigating water residence time effects on in-lake temperatures and stratification dynamics of a small temperate lake	Landscape
James Jackson	Mathematics and Statistics	Are There 10,000 Slaves in the UK?	Landscape
James Kennedy	engineering	Decontamination of Plutonium Contaminated Brick Surfaces	Landscape
Jamie Dumayne	Astrophysics	Classifying galaxies: The good, the bad and the elliptical	Landscape
John Ball	Lancaster Environment Centre	Geophysical Monitoring of a river embankment in Hull: Results so far and plans for the future	Landscape
Katharina Hertenburg	LEC	soil compaction and drought in the field	Landscape
Nicola Rennie	STOR-I (Mathematics & Statistics)	Identifying and responding to outlier demand in revenue management	Landscape
Niloufar Zabhi	Engineering	Energy Harvesting from Road Pavements	Landscape
Norbert Sieczkiewicz	Engineering	Towards Industry 4.0 - surface autofocus method for electron beam welding (EBW)	Landscape
Rachael Taylor	Psychology	Can the Left Hand Benefit from being Right?	Landscape
Ruth Carter	Lec	Control of the Fall Armyworm moth (<i>Spodoptera frugiperda</i>) in Africa: effect of soil conditions on the Fall Armyworm?	Landscape
Samantha Howlett	Ecology and Conservation	Top-down and bottom-up drivers to grazing rates across space and time	Landscape
Samantha Russell	Psychology	Children see Rabbit, not Peter: Young Children's Responses to an Anthropomorphic Picture Scale	Landscape
Sarah Chadwick	Psychology	Location, location, location: Power analysis as accurate and precise parameter recovery	Landscape
Simon Vecken	Engineering	Innovative Microwave-Plasma Gasification Technology	Landscape
Sofija Durward	Physics	How steady is the Sun's magnetic field at Mars?	Landscape
Sophie Lau	Chemistry	Good cholesterol, can it be better?	Landscape
Tomasz Gonet	Lancaster Environment Centre	Chasing Alzheimer's Disease	Landscape
Yuri Tavares dos Passos	School of Computing and Communications	Comparing algorithms for common target congestion in robotic swarm by throughput of shared goal area	Landscape
Abbie Marono	Psychology	The effects of interpersonal Closeness on Nonverbal Mimicry during Face-to-Face Interactions	Portrait
Abdullah	Physics	switching quantum interference behavior	Portrait
Alexander Jackson	Engineering	A Study of the Effectiveness of Board Games in Stakeholder Workshops for the Discussion of Sellafield Site Futures	Portrait
Amira Zied Abozied	Engineering	Design and fabrication of millimetre and submillimetre wave vacuum electronic devices for 5G wireless networks	Portrait
Caroline Holroyd	Engineering	Advanced position-sensitive neutron detection	Portrait
Chiemeia Victor Amaechi	Engineering	Novel Composite Riser Development for Offshore Deep water applications	Portrait
Elise Oosterhuis	Psychology	Getting the Brain into Gear: Cognitive Reserve, Lexical Access, and Functional Connectivity in Healthy Ageing	Portrait
Ellie Vaughan	LEC	Precision and Cost-Effectiveness of Bioreactors to Estimate Nutrient Regimes on Coral Reefs	Portrait
Frederick Otu-Larbi	LEC	Modelling the effect of the 2018 summer heatwave and drought on isoprene emissions in a UK woodland	Portrait
George Liddle	Maths	Scaling Limits of a Planar Random Growth Process	Portrait
Jack Garnett	LEC	Snow and sea ice as important pathways of chemical pollutants into the Arctic marine ecosystem	Portrait
Kim Suave	Computing and Communications	A Change of Perspective: How User Orientation Influences the Perception of Physicalizations	Portrait
Leonardo Forcieri	Physics	Seeing atoms in the quietest place on Earth	Portrait

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03/12/2019

Majed Mutlaq A Alshammari	physics	Constructive Quantum Interference in single-molecule junctions.	Portrait
Mandy Stoker	LEC	Carbon & Cover Crops - Adding evidence to decision making	Portrait
Matthew Chan	Physics	Fishing for Galaxy Clusters with Deep Neural Nets	Portrait
Michael Wolfe	LEC	Megacities, PM and Diffuse Light impacts on Crop Yields in the North China Plains	Portrait
Nicola Zagni	Engineering	Experimental and theoretical study of the corrosion of uranium nitride	Portrait
Patrick Mfunyi	Engineering	Autonomous submarine radiometrics for off-shore radioactive particle surveillance	Portrait
Patrick Skilleter	Lancaster Environment Centre	Intervarietal Variation of Potato Deep Root Architecture in a Field Environment	Portrait
Phoebe Sulton	LEC	How can light control vitamin biosynthesis?	Portrait
Rabia sannan khan	Engineering	Vibrational spectroscopic evaluation of diabetes and its correlation with oral cancer using saliva	Portrait
Rebecca	Psychology	Differences in Empathic Gaze With Animals	Portrait
Sorala Elisio	Engineering	In-situ groundwater monitoring to improve identification of ground/soil contamination	Portrait
Yi Yin	Engineering	Real-Time Electron Beam Weld Shape Prediction Based on Electron Beam Probing Technology	Portrait