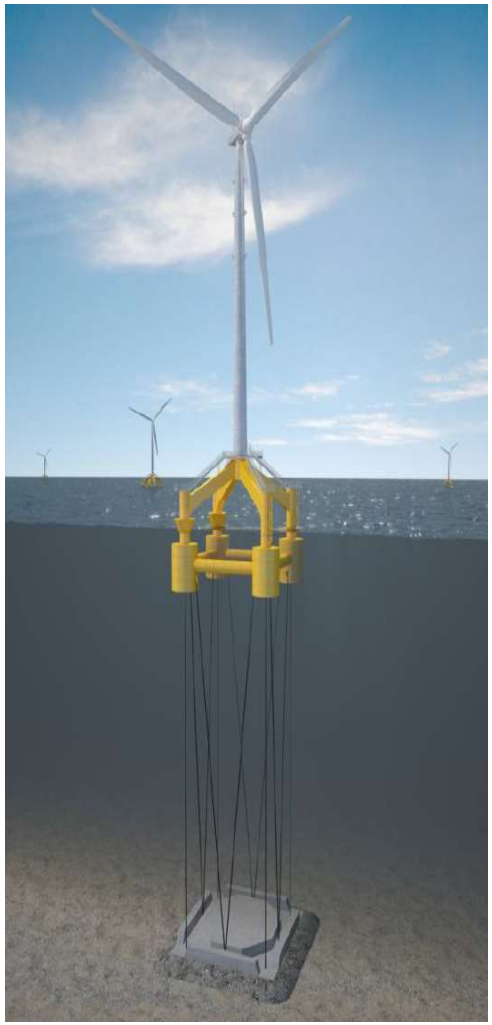


UK-China ORE Centre for Offshore Renewable Energy

中英海洋能联合研究计划

Prof Lars Johanning

The University of Exeter

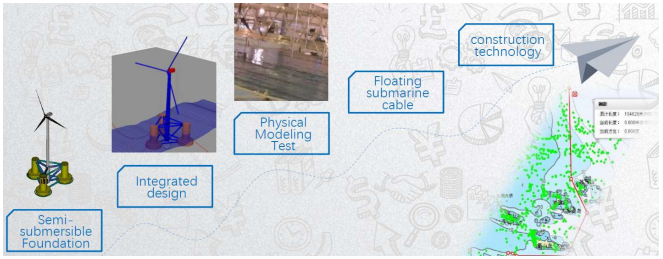
Chair of UK&CHN | CORE

L.Johanning@exeter.ac.uk

Qingdao, 7th - 9th July 2019

UK&CHN Centre for Offshore Renewable Energy

In 2017 a joint call for proposal from EPSRC, NERC and NSFC enabled establishment of UK&CHN Centre for ORE with five active projects



The UK – China Offshore Renewable Energy centre aims to develop the next generation of offshore renewable energy (ORE) technologies to enable the safe, secure, cheap and efficient provision of clean energy.

As part of that programme, EPSRC and NERC and NSFC (Grant No. 51761135011) have co-funded 5 UK-China Projects:

- **ResIn: Resilient Integrated-Coupled FOW platform design methodology;** Lars Johanning and Bing Chen (EP/R007519/1)
- **FENGBO-WIND: Farming the Environment into the Grid: Big data in Offshore Wind;** Mike Graham and Yonghua Song (EP/R007470/1)
- **Extreme wind and wave loads on the next generation of offshore wind turbines;** Tom Adcock and Ye Li (EP/R007632/1)
- **INNO-MPP: Investigation of the novel challenges of an integrated offshore Multi-Purpose Platform;** Maurizio Collu and Liang Zhang (EP/R007497/1)
- **MOD-CORE: Modelling, Optimisation and Design of Conversion for Offshore Renewable Energy;** Alasdair McDonald and Li Ran (EP/R007756/1)

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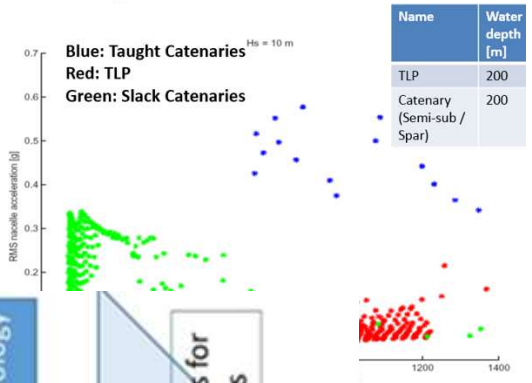
ResIn: Resilient Integrated-Coupled FOW platform design methodology

Lars Johanning and Bing Chen

Design Load estimation



Name	Water depth [m]
TLP	200
Catenary (Semi-sub / Spar)	200

WP1: Environmental climate conditions modelling and resilience evaluation

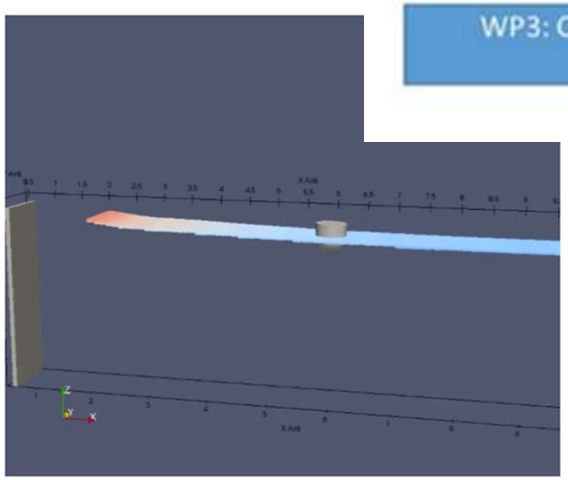
WP2: Resilient design innovations

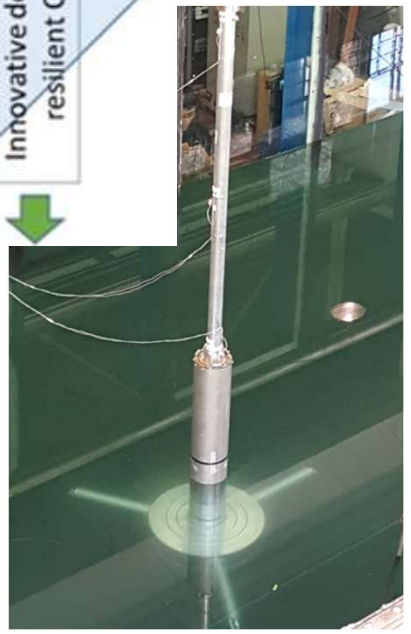
WP3: Coupled interactive computational modelling

WP4: Resilience approach centred on a risk based design methodology

Innovative designs and tools for resilient ORE installations

Wave-structure interaction





Imperial College London

FENGBO-WIND; Farming the Environment into the Grid: Big data in Offshore Wind

Mike Graham and Yonghua Song

Xiaowei Zhao (EE)
Xiuxing Yi

WARWICK
THE UNIVERSITY OF WARWICK

Imperial College London

Yonghua Song (EE)
Jin Lin (EE)
Haohuan Fu (ESE)

Yonghua Song (EE)
Can Wan (EE)
Haijiang Liu (CE)

Mike Graham (AE)
Matt Piggott (ESE)
Rafael Palacios (AE)
James Percival (ESE)
Yorgos Deskos

Cefas

Yonghua Song (EE)

DNV·GL

FTI CONSULTING

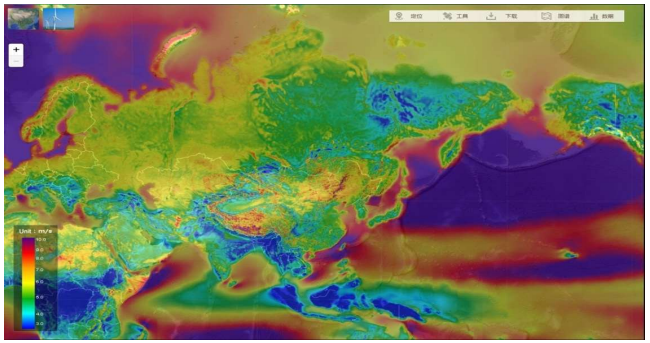
国家电网 STATE GRID

ENVISION

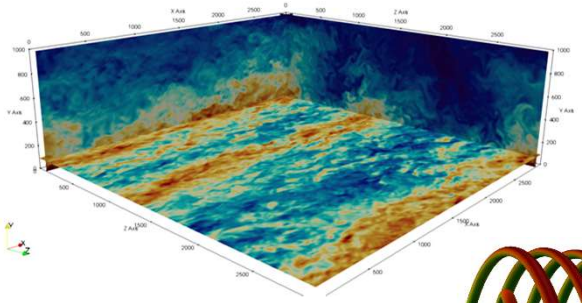
ENERGY RESEARCH INSTITUTE

Imperial College London

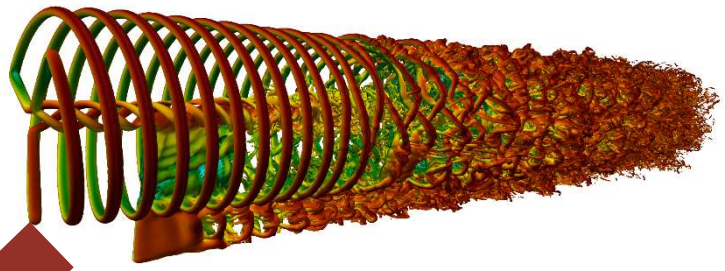
Research activities



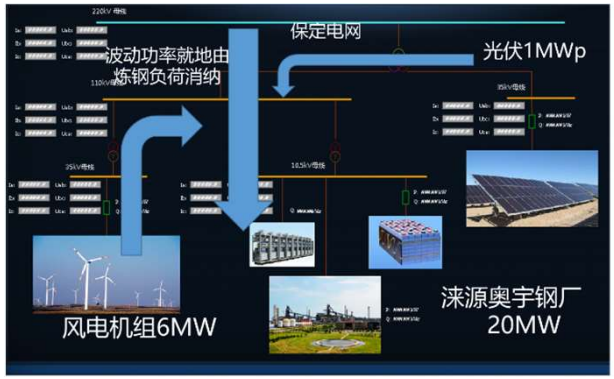
Global Wind Power (Tsi)



Farm control (ICL/UW)



Turbulence resolving simulations (ICL)



Smart grid design (Tsi)

ICL/ZJU Joint Applied Science Data Lab (ZJU)

Extreme wind and wave loads on the next generation of offshore wind turbines

Tom Adcock and Ye Li

- Shanghai Jiao Tong University
  - Prof Ye Li
  - Prof Shijun Liao
  - Prof Jian Yang
- National Climate Centre, Beijing
  - Dr Ge Gao
  - Prof Xiuzhi Zhang
- University of Oxford
  - Prof Thomas Adcock
  - Prof Richard Willden
  - Prof Ross McAdam
  - Prof Ton van den Bremer
- University of Edinburgh
  - Prof Alistair Borthwick

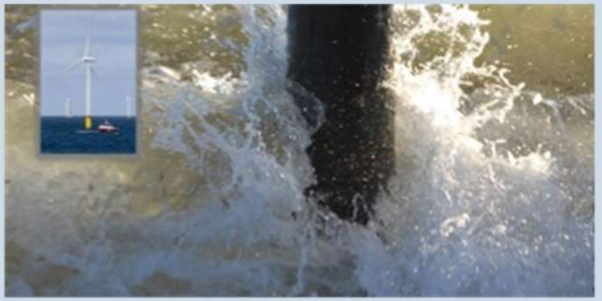
UNIVERSITY OF OXFORD

SHANGHAI JIAO TONG UNIVERSITY 1896

THE UNIVERSITY OF EDINBURGH

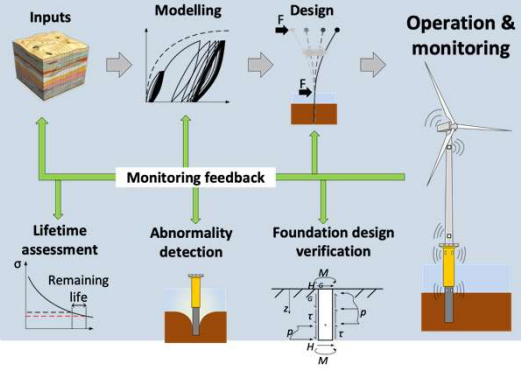
Wave environment

Wave loads



Wind environment and loading

Field verification



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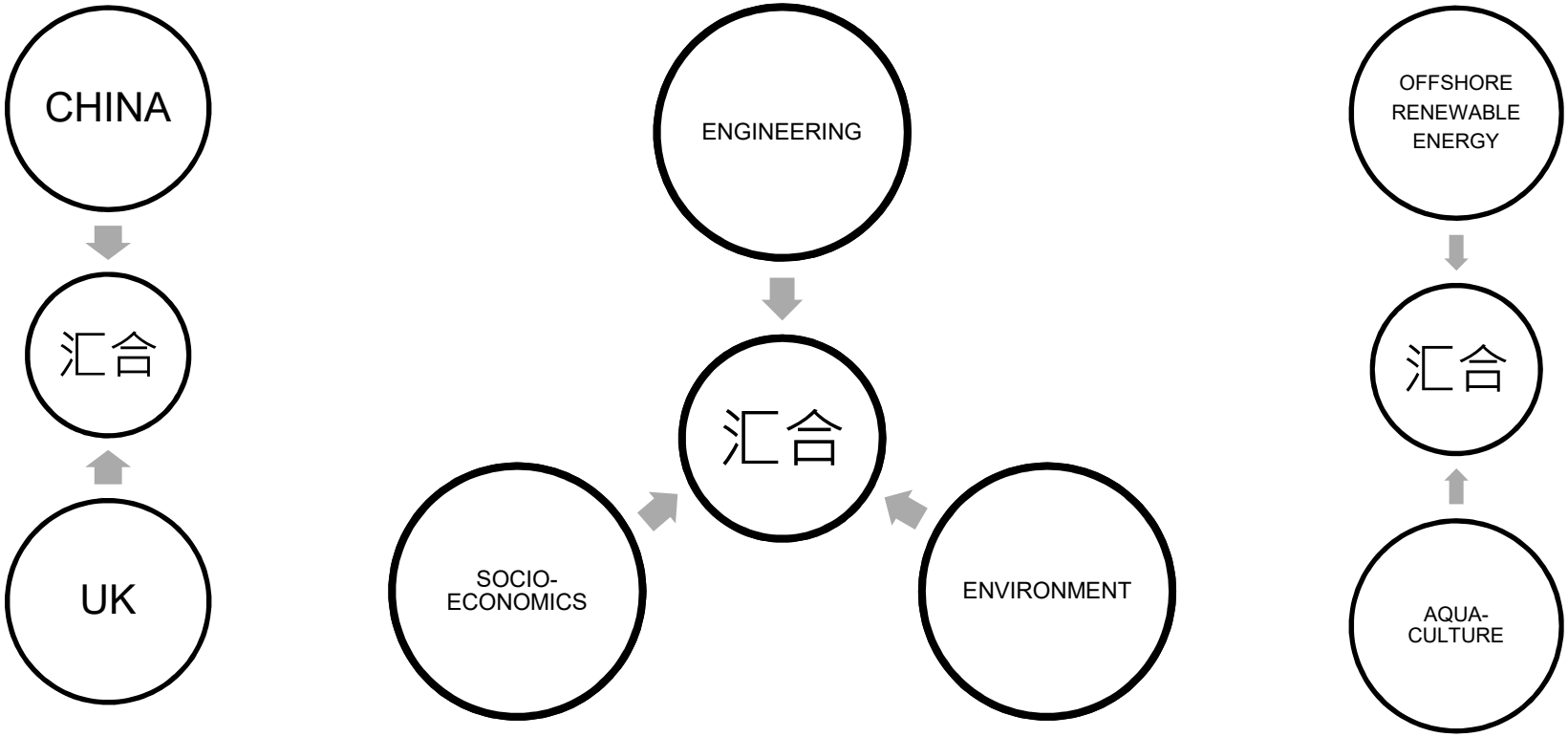
INNO-MPP: Investigation of the novel challenges of an integrated offshore Multi-Purpose Platform

Maurizio Collu and Liang Zhang

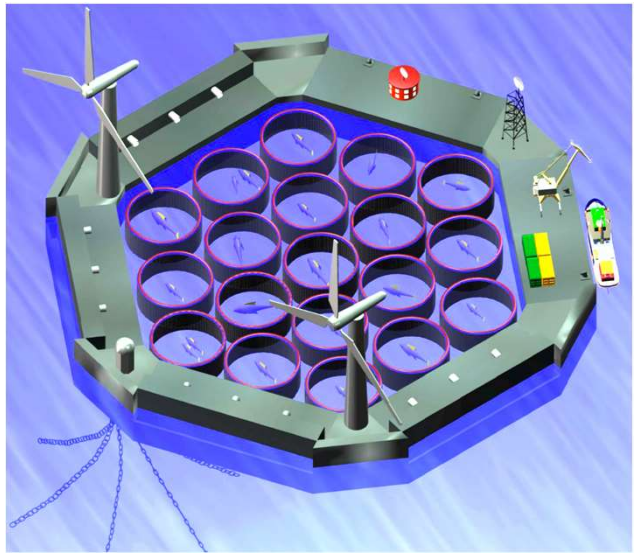


Maurizio Collu (UK) and Sun Ke (P.R. China)
INNO-MPP Principal Investigators
maurizio.collu@strath.ac.uk

Multi-purpose platform (MPP)

A platform that serves the needs of more than one offshore industry

CASE STUDIES



A: Changdao Archipelago

MPP providing electricity, food, and jobs to a small island community

B: West Scotland

Far-offshore, deep-waters aquaculture system powered by renewable energy

A multi-disciplinary approach (Engineering, Environmental Sciences, Social Sciences) to identify:

- The best synergies to exploit (e.g. CAPEX and OPEX sharing)
- The worst tensions to avoid (e.g. impact of O.R.E. on aquaculture productivity)

Modelling, Optimisation and Design of Conversion for Offshore Renewable Energy

Alasdair McDonald and Li Ran

MOD-CORE

Objectives of UK – China ORE projects

Sharing

This UK-China CORE program will help to develop the interface between researchers and the user community in government and businesses outside the programme membership, and to share research outcomes, data resources and best practice between the grants – all designed to maximise impact.

Knowledge

The ORE program ambition is to develop the next generation of technologies for the safe, secure, cheap and efficient provision of clean energy, building resilience against extreme events into ORE systems.

Innovation

The activities will be directly build into a 'Research Bridge' using the outcomes to exchanging the knowledge into the other themes, whilst using the bridge to inform the activities within this project to enable a joined-up interdisciplinary and international programme of work.

Impact

To develop a knowledge exchange strategy which incorporates a plan of co-ordinated activities and details how the research teams will work together to engage stakeholders and maximise impact through the establishment of the UK-China CORE programme

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UK & CHINA CENTRE FOR OFFSHORE RENEWABLE ENERGY

UK&CHN CORE Engagement activities

Key elements of Engagement plan:

i) 3 cross-country events,
ii) Summer Schools,
iii) Public School engagement,
iv) internships
v) flex funds

All researchers will hopefully actively engage in this activities enabling a cross-country knowledge exchange and research collaborations.

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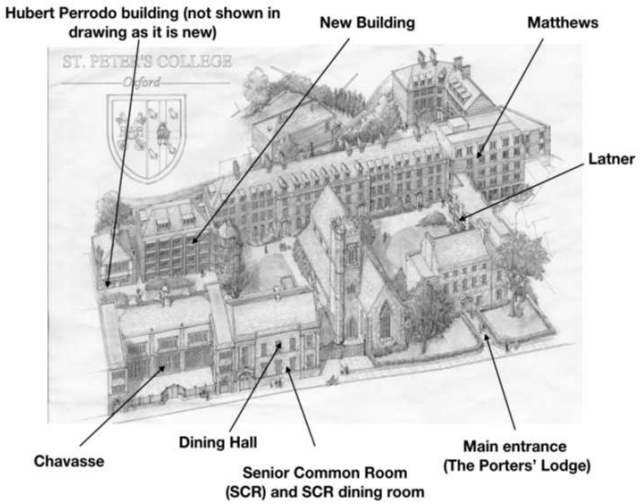
3x UK & China ORE events



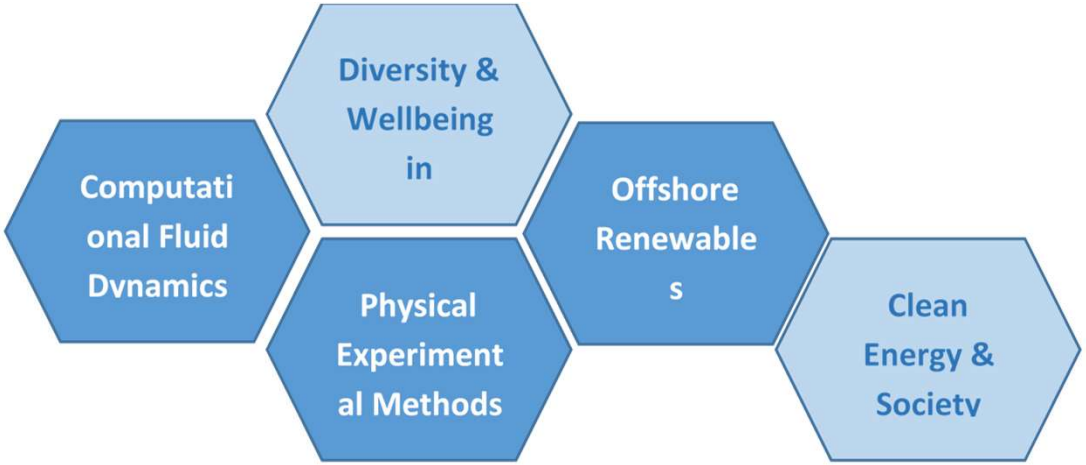
Oxford 2018 - Qingdao 2019 - Beijing 2020

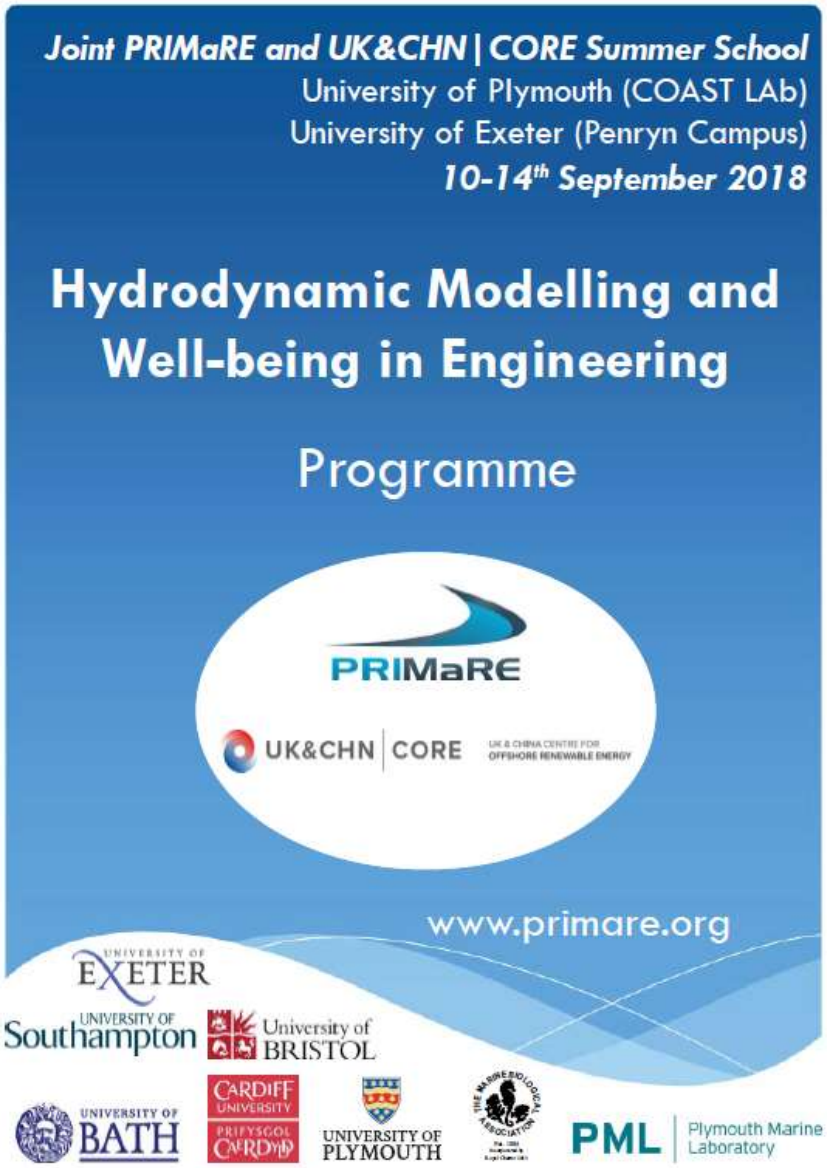
- Update on latest research outcomes
- Knowledge Exchange

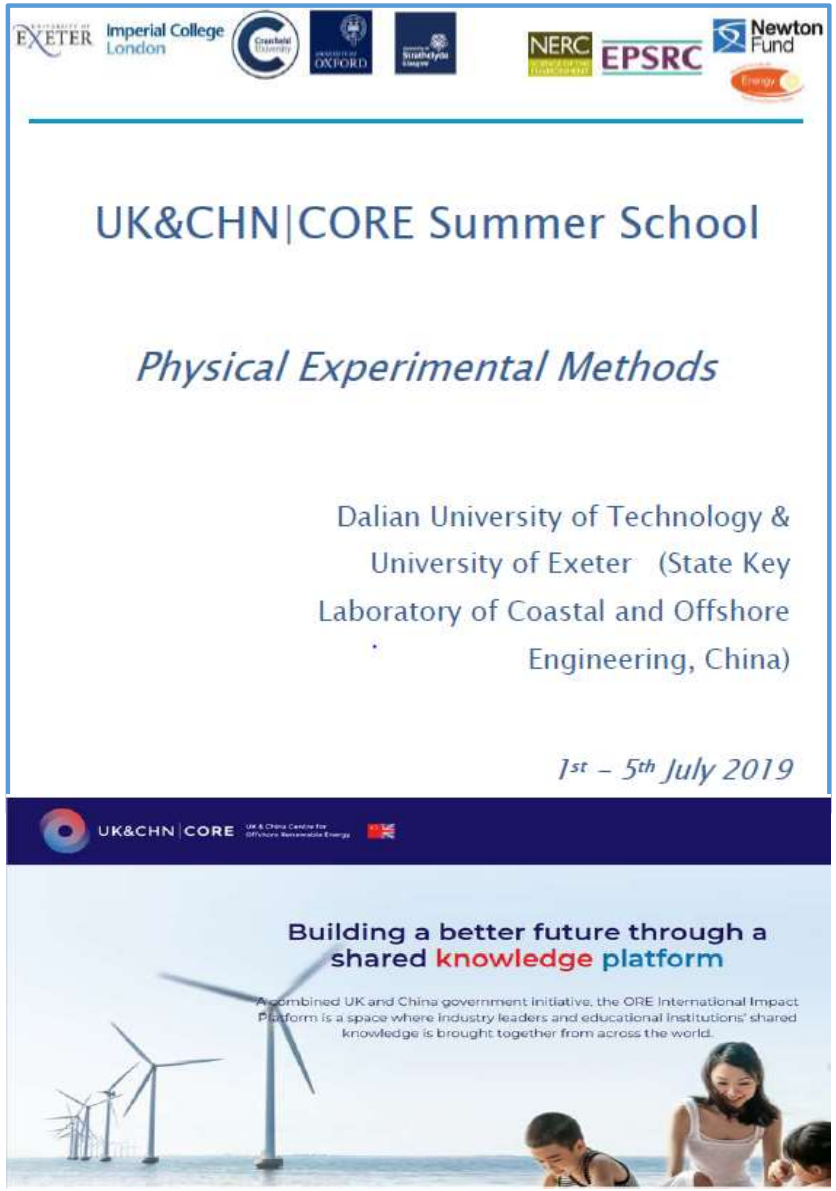
- Collaboration building
- Future R&D needs

Summer schools

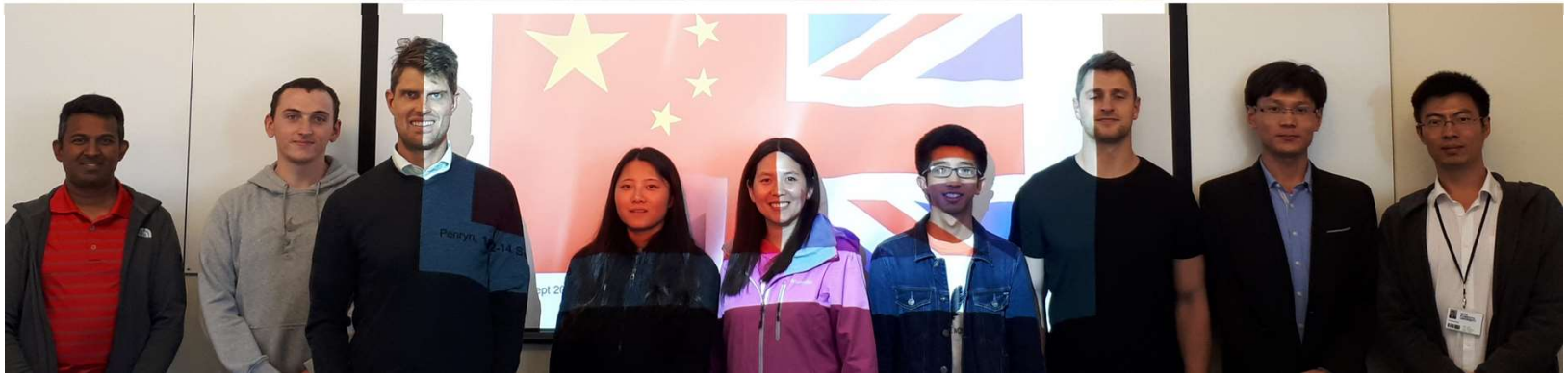
1. Imperial, UK (Oxford / TBC) - Computational Fluid Dynamics, July -18
2. Exeter, UK (Falmouth) - Diversity & Wellbeing in Engineering, Sept -18
3. Dalian, China (DUT) - Physical Experimental Methods, July-19
4. Strathclyde , (Glasgow) - Clean Energy and Society, Sept -19
5. Strathclyde (Glasgow) - Offshore Renewables Technology, Mar-20




Joint PRIMaRE and UK&CHN | CORE Summer School
University of Plymouth (COAST LAb)
University of Exeter (Penryn Campus)
10-14th September 2018
Hydrodynamic Modelling and Well-being in Engineering
Programme
PRIMaRE
UK&CHN | CORE
UK & CHINA CENTRE FOR OFFSHORE RENEWABLE ENERGY
www.primare.org
UNIVERSITY OF EXETER
UNIVERSITY OF Southampton
University of BRISTOL
UNIVERSITY OF BATH
CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD
UNIVERSITY OF PLYMOUTH
PML
Plymouth Marine Laboratory


UK&CHN|CORE Summer School
Physical Experimental Methods
Dalian University of Technology &
University of Exeter (State Key
Laboratory of Coastal and Offshore
Engineering, China)
1st – 5th July 2019
UK&CHN | CORE
Building a better future through a shared knowledge platform
A combined UK and China government initiative, the ORE International Impact Platform is a space where industry leaders and educational institutions' shared knowledge is brought together from across the world.


ReSin-1st UK-China Workshop 中英海洋能合作项目第一次研讨会



Inspiring tomorrow's Scientists and Engineers

Milngavie Primary School, in Milngavie, near Glasgow (Scotland)

On the 10th of January 2019, Dr Maurizio Collu was very busy answering many questions of around fifty young and bright students (10-11 years old) of the Milngavie Primary School.

Cléa Maricourt

I am a 21-year-old French student from the engineering school École Centrale de Nantes. I am currently in my first year of master where I study hydrodynamics, sea keeping, offshore renewable energies, naval architecture

"…I would love to work in the offshore renewable energy field as I feel it is high time for us to focus on more efficient, sustainable and renewable energy sources. "

Juliette Leprou

I am 22 and I am French student of the naval architecture and offshore platform master at ENSTA Bretagne in Brest.

“ …I like what is related to renewable energies and specifically in marine environment because I feel concerned by the need of innovative solutions for a better use of the resources of the Earth. “

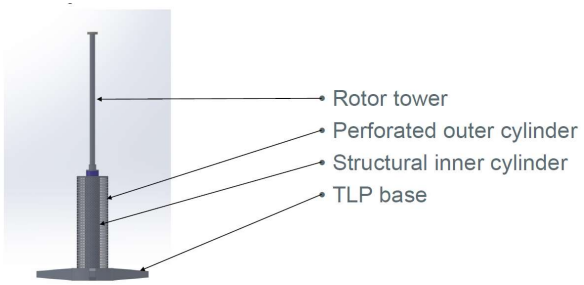
Flex Funds

Aim: To encourage cross programme partnership, and to help early career researchers with building their track record.

Process:

- Flexible funding calls will be established allowing internal early career researchers (ECR) within the ORE UK-CHINA projects
- The funding will allow internal ECRs to engage with each other applying for collaborative projects within industry or at international organisations
- Funding will be made available for travel or consumables enabling these collaborative ECR activities.

- First round of projects have been awarded in 2019



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info@ukchn-core.com

www.ukchn-core.com

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Latest UK-CHN CORE news

OMAE Glasgow 9-14 June 2019

The UK-CHN CORE was well represented at the 38th International Conference on Ocean, Offshore & Arctic Engineering this year.

Dr Edward Mackay et al., University of Exeter – Numerical and Experimental Modelling of Wave Loads on Thin Porous Sheets

Dr Ajit Pillai, Prof. Lars Johanning et al., University of Exeter – Impact of Simulation Duration Analysis for Offshore Floating Wind Turbines using a Coupled FAST-Orcaflex Model

Ms. Rachael E. Smith et al., University of Exeter – Impact of Rotor Misalignment due to Platform Motions on Floating Offshore Wind Turbine Blade Loads

Prof. Dezhi Ning et al., Dalian University of Technology – Experimental and Numerical Investigations on Wave Dynamics of a Dual-Chamber OWC Wave Energy Device

Dr. Dongsheng Qiao et al., Dalian University of Technology – Snap Load Induced by Slack-Taut Process in a Taut Mooring Line

Dr. Xingya Feng et al., University of Oxford – Numerical Analysis of Nonlinear Wave Loads on an Offshore Wind Turbine Monopile

Dr. Yan Li et al, University of Oxford – Linear Evolution of a Narrow-Banded Surface Gravity Wavepacket Over an Infinite Step

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Publications →

Home > Publications

Publications

Current and future research fundamentally relies on access to the findings and ideas that come out of publicly-funded research.

As a result the UK-CHINA CORE program fully support the concept of universal access so that everyone can benefit from research outcomes and publications are in compliance with funder open access requirements.

Verification of a Boundary Element Model for Wave Forces on Structures with Porous Elements	Document	Download →
A SIMPLE AND ROBUST METHOD FOR CALCULATING RETURN PERIODS OF OCEAN WAVES	Document	Download →
Long-term distributions of individual wave and crest heights	Document	Download →
A generalised equivalent storm model for long-term statistics of ocean waves	Document	Download →

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Thank you for listening

Questions

L.Johanning@exeter.ac.uk