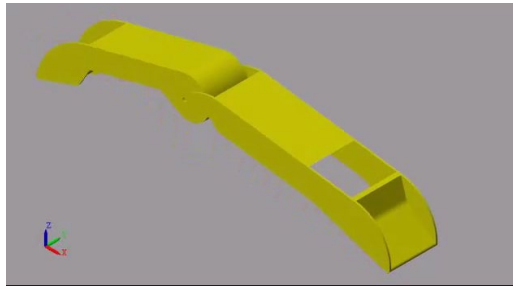
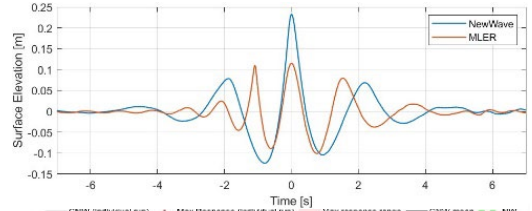
WP4 – Design

Aim: Develop & validate design methods for floating ORE devices



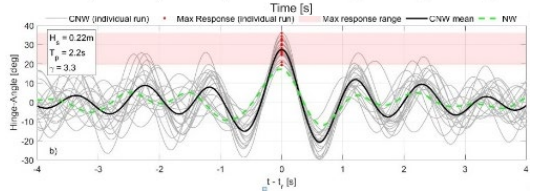
Existing Methods/Present Design Standards

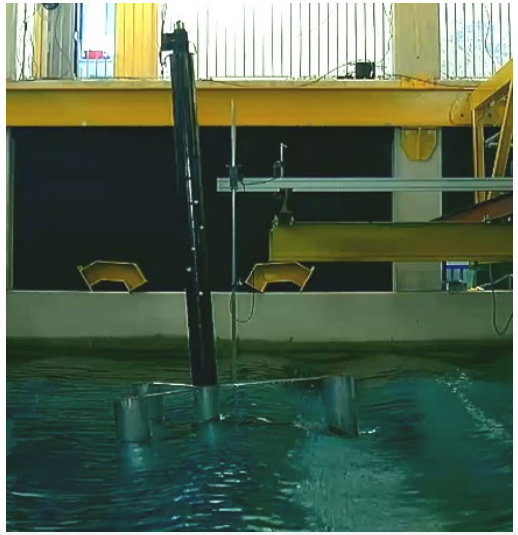
- Probabilistic approaches using large number of irregular sea states
- Robust but requires large quantities of simulated data



Short Design Waves (SDWs):

- More efficient method for characteristic load prediction in-line with design standards has been developed
- Single/embedded wave group to produce extreme responses
- Tested on a range of floating devices (WECs, FOWT)
- Promising results relative to present recommendations
- SDW procedures need refining for particular applications





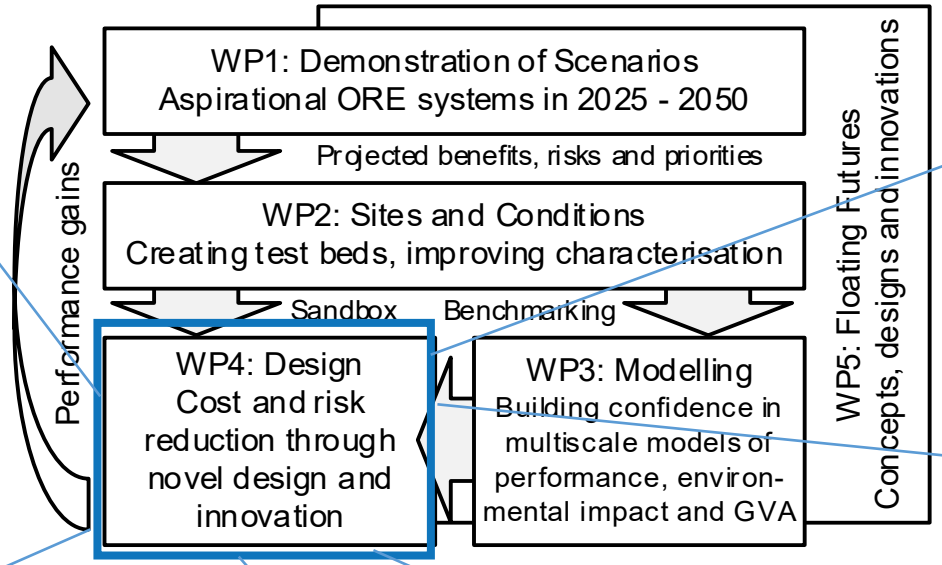
Future Work:

- Wider range of device (TLPs, Spars), response and mooring types
- Recommendations for floating ORE best practice/design standards
- Optimise SDW procedures (e.g. background wave selection)

Linkages within Core Research Programme

Spatiotemporal wind field prediction based on physics-informed deep learning

THE UNIVERSITY OF WARWICK



Smart Distributed Sensors for ORE applications

UNIVERSITY OF HULL

Monopile and multi-pile ORE Foundations

UNIVERSITY OF OXFORD

Whole-life modelling of anchor capacity for floating systems

UNIVERSITY OF Southampton

Very Large Floating Structures

University of Strathclyde

Dynamic Subsea Power Cables: Modelling & Testing

UNIVERSITY OF EXETER

Supergen Offshore Renewable Energy

UNIVERSITY OF PLYMOUTH

UKRI Engineering and Physical Sciences Research Council

Flex funded research linkages within Research Landscape Theme E: Survivability, Reliability and Design

- Passive control of wave induced platform motions for semi-submersible FOWTs.
- Novel approaches for physical model testing of floating wind turbine platforms.
- Physics-informed machine learning for rapid fatigue assessments in offshore wind farms.
- Investigation into the coupling of a wave energy converter with a reverse osmosis desalination plant.
- FASTWATER: Freely-Available mesoScale simulation Tool for Wave, Tides and Eddy Replication.

- Submerged bi-axial fatigue analysis for flexible membrane Wave Energy Converters.
- Smart piezoelectric metamaterials for partial discharge monitoring.
- A hybrid and scalable digital twin for intelligent direct drive powertrain condition monitoring.

Flex funded research linkages within Research Landscape Theme E: Survivability, Reliability and Design

- LoadTide – fatigue assessment of tidal turbine blades.
- Improved models for multivariate metocean extremes (IMEX).
- iDRIVE: Intelligent driveability forecasting for offshore wind turbine monopile foundations.
- Cost Effective Methods of Installing Offshore Wind Infrastructure.
- Advanced, Modular Power Take-Off Design for Marine Energy Converters.
- SharEd Anchor Multidirectional Load Envelopes with Strength Synthesis (SEAMLESS).

- V-SCORES(Validating Surface Currents at Offshore Renewable Energy Sites).
- Demonstrating a machine learning system to integrate metocean data, sensor networks, and model output for improved coverage and accuracy.