

SURFTEC – SURvivability and Reliability of Floating Tidal Energy Converters

Alison Williams, Michael Togneri,
Nick Croft, Ian Masters
Swansea University

SURFTEC Overview

- Project focuses on Floating Tidal Energy Converters (FTECs)
 - Devices that move in relation to changes in sea level
 - One or more turbines suspended from a floating structure
- Issues associated with costs and operation
 - Identifying and understanding extreme loads
 - Environmental extremes
 - Determining accessibility, serviceability, fault intervals and device life cycles
- Aim is to produce a design optimisation tool
 - Reliability and Survivability of FTECs



SURFTEC - Objectives

- Carry out a measurement campaign with FTEC developer
 - Data set with synchronous measurements of flow conditions (current and waves), device position/orientation, loads
- Develop numerical model that couples Swansea University's BEMT code with a floating platform model
 - Predict motions and loads on a FTEC
 - Validated using data gathered in previous objective
- Produce a FTEC design and operational strategy document
 - Guidelines to improve device reliability and survivability
 - Based on validated numerical model
 - Tested with wide range of environmental conditions
 - Prediction of fatigue and failure in response to loads



Industrial partners

- European Marine Energy Centre (EMEC)
 - Environmental data for range of conditions
 - Link to FTEC developers
- Black and Veatch
 - Guidance on effect of loads on fatigue damage and failure
 - Component costs



Numerical model background

- Swansea University Blade Element Momentum Theory code
 - Well validated model
 - Rotor loads
 - Corrections for tip/hub loss and high induction
 - Predicts current and wave loads on conventional fixed support structure
 - Morison equation
 - Appropriate for vertically aligned cylindrical structures



Numerical model development

- Dynamics of a FTEC
 - Loads on the support structure caused by waves, currents and turbulence
 - Implementation of the Cummins equation model
 - Couple with BEMT model



Project staff

- Currently advertising for a RA to work on the project
 - Aiming to appoint early in 2017
- PhD student
 - Match funded by College of Engineering, Swansea University
 - To be recruited...