

EWTEC 2017

I recently attended the 2017 EWTEC (European Wave and Tidal Energy Conference) event.

Below is a brief summary, and some thoughts on the potential opportunities for SHM in the marine renewable energy field.

Introduction:

The EWTEC (European Wave and Tidal Energy Conference) is probably not a well-known conference series in the Dynamics community, but it is the leading European conference for developments in Marine Renewable Energy. The focus is on Wave and Tidal power, though OTEC (Ocean Thermal Energy Currents) and similar alternatives do also get a mention.

The biannual conference first took place in 1993 and has grown every year since, this year taking place in Cork, where over 400 papers were submitted.

My background is in hydrodynamics and tidal power, and after presenting the results of my PhD and first Post-doc at the 2015 version of the conference in Nantes, I returned to EWTEC in 2017 to see what progress had been made.

The conference was well organised University College Cork. The conference schedule did not leave a lot of time for exploring, but Cork is a lovely city. UCC itself was founded in 1845 and has a very nice campus, particularly the impressive central Quadrangle.



University College Cork

The conference dinner took place at the equally impressive (but much more modern) Cork City Hall, where it was also announced that the next EWTEC will take place in Naples in 2019. In 2018, the traditionally offset Asian Wave and Tidal Energy Conference (AWTEC) will be held in Taipei.

The Conference:

The conference took place over 4 days, with six parallel sessions each day. This meant that unfortunately there were often interesting talks on similar subjects running concurrently, hence it was not possible to listen to everything which sounded good. However, the session rooms were

relatively close together and the chairs did a good job of keeping sessions to schedule, so it was just about possible to jump from one session to another between talks.

After a rousing opening speech from Prof. Tony Lewis, during which he and colleagues reminded the participants that we must all act as advocates of marine renewable energy in our professional and personal lives, the conference proper began.

On day one I attended sessions on Tidal Hydrodynamic Modelling, Tidal Device Development, and Tidal Resource Characterisation. On day two I focussed on Wave power, attending Wave Hydrodynamic Modelling, Device Design, Mooring and Foundation design, and Device Development. On day three I attended sessions on Tidal Device Development, Device Testing, Grid integration and Power Take-off. On the final morning I attended two sessions on Structural Mechanics, Materials, and Fatigue loadings.

State of the field:

Since I last attended EWTEC the tidal and wave industry appears to have taken large steps forward in certain areas, but remained almost static in others.

In the tidal field, where much of the positive progress has focussed, there has been a move towards simple devices, with the aim of “getting something in the water” to test systems in situ. This can be seen in the rapid development of companies like Sabella, who have designed, developed and deployed a relatively simple tidal turbine. The turbine is now operating and supplying energy to the French island of Ushant.



Deployment of the Sabella D10 turbine

This progress is positive for the industry, which for a long time has appeared nearly ready to start making a real contribution to electricity generation. The challenges are now as much economic as technical, but engineering questions such as how to improve reliability and reduce maintenance costs are of course fundamentally technical ones.

Relevance to SHM:

I wanted to try to identify areas in which our group expertise may be of use in the future, and to try to spot any potential future avenues for research.

There has not historically been much work on structural health monitoring undertaken in the marine renewables field, and this currently remains the case. The only presentation in the entire conference to specifically discuss Structural Health Monitoring was given by Dr. Dongning (Tony) Zhao of the University of Ulster. Dr. Zhao discussed the incorporation of thin-film sensors into tidal turbine blades to develop a strain-based SHM system. However, this system is in its infancy and the current focus is the incorporation of the sensors into the blade rather than the actual monitoring strategy.

Other work presented over the conference showed opportunities for SHM: It was repeatedly highlighted that the industry is at a turning point and must now dramatically reduce costs and become economically viable. Work by Magagna, Monfardini and Uihlein from the EU DG Joint Research Centre observed that according to the "SET-Plan", Tidal technologies are expected to reach a levelised cost of energy (LCOE) of 15 cEUR/kWh by 2025. To meet this target, technology costs need to be reduced by about 75 % from 2016 levels. The work estimates that an average tidal project has an OpEx (Operating and maintenance expenditure) / CapEx (Capital expenditure) split of 32% / 68%. As CapEx is reduced by economies of scale in installation and experience-based efficiency improvements, the importance of OpEx will rise and focus will begin to move to reducing maintenance costs. This is where opportunities for SHM lie.