



Name: Stefano Parmeggiani



PhD Thesis: Development and testing of the Wave Dragon Wave Energy Converter. Aalborg : Department of Civil Engineering : Aalborg University, Unpublished

Abstract: The research study is part of the Wavetrain2 project, a multinational Initial Training Network (ITN) funded under the European FP-7 People program. It aims at addressing a wide range of challenges that the industrial-scale wave energy implementation faces currently or will be confronted with in the near future.

The research is aimed at the development and testing of the Wave Dragon Wave Energy Converter in its pre-commercial phase. The primary aim of the research will be to update the overtopping model already existing for the device in order for this to maintain a general applicability, but at the same time increase the quality of the predictions for any overtopping device. The model formulation will be updated and calibrated to the specific Wave Dragon case through experimental tank testing of a 1:51.8 scale model. Once established, the updated formulation will be implemented in a numerical model easily allowing for predictions of the overtopping flow and hydraulic power production depending on the local conditions and setup configuration of the device. Later on, it is expected that this can be coupled to a code simulating the power take-off regulation (turbines control strategy) in order to be able to predict the performance of the device at following power production stages. Altogether, this will provide a comprehensive tool to predict the performance of the device at various scales, locations and stages of power production.

The evaluation of the behaviour of the device under extreme wave conditions as well as the assessment of control techniques aimed at the reduction of the extreme loads on the mooring system will also be a topic of research. Based on experimental data, possible solutions for the mooring system will be modelled numerically and a feasible layout will be proposed for the first full scale unit. Based on the real sea data acquired during the trials of the prototype deployed since 2003 in Nissum Bredning, the performance of the device at various stages and at various possible deployment locations will be assessed applying a methodology proposed by the European project Equimar.

Regulatory, socio-economic and environmental issues related to the deployment of the first full-scale unit in Welsh waters will also be investigated and possible solutions addressed during the research.

Supervisor: Associate Professor Jens Peter Kofoed

Employed: 01.04.2010 - 31.03.2013