



European Safety, Reliability and Data Association

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UNIVERSITÉ DE NANTES

54th ESReDA Seminar on

Risk, Reliability and Safety of Energy Systems In Coastal and Marine Environments



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Carnegie Wave Energy Limited

Nowadays, sustainable energy production becomes a very challenging issue and most of the economically developed and underdeveloped countries plan rapid evolution in the 15 coming years. The climate changes can be already felt in most of them. Meanwhile, when the UNESCO revealed that 16% of the population lived by the seaside (less than 100km from the coast) in 1990, this percentage reached 50% in 2010 and is planned to jump to 75% in 2035⁽¹⁾. Energy production from the sea or from the littoral is herein not only an opportunity with the ocean covering approximately 71% of the Earth surface, but also a chance with only few installed industrial systems in comparison with the potential and the existing scientific and technological knowledge (environmental resources, controlled energy systems, grid optimization and materials in sea environment).

Since the early 2010's, the European Community promotes researches and innovations in the field of Marine Renewable Energy, with the improvement of existing wind offshore industry based on fixed structures, the promising development of floating wind energy with increasing turbine capacities, the related increase of blade length and of the total height of the structure and the potential offered by ocean energy (wave, tidal, thermal). Recently, in 2016, the European Strategic Energy Technology Plan (SET-plan) wrote in its roadmap that the key goal is to reduce the LCOE (Levelized Cost Of Electricity) and set the target of 7 ct€/kWh to be reached by 2035. To reach this ambitious target, the European Platform of Universities in Energy Research & Education (EUA-EPUE⁽²⁾) recommends to develop system reliability, maintenance and structural health monitoring optimization and to increase service lifetime from 25 years now to 35 years.

There are many technical issues and human challenges where risk, reliability and safety are involved: evaluation of uncertain resources (wind, wave, currents), material reliability, complex system reliability, electrical grid optimization, collision with ships, governance of risk in a multi-usage area (fishing, tourism, maritime transport, European defense).

(1) Simon K. Haslett, *Coastal Systems*, Routledge, 2009 (ISBN 978-0-415-44060-8)

(2) EUA-EPUE Response to SET-Plan Consultation, Key Action No. 1 and 2: "Ocean Energy"

The aim of the 54th ESReDA seminar is to bring together scientists, engineers and decision makers in the field of complex engineering system safety, structural health monitoring, cost/benefit assessment and risk management, in order to present and discuss innovative methodologies and practical applications related to complex system reliability, economical risk and human risk in complex environment. Scientific methodologies, theoretical issues and practical case studies are expected to cover all the range from academic to industrial applications, including electro-mechanical and civil engineering.

Topics include (but are not limited to):

- Reliability-based design and optimization (including structural, material and electro-mechanical issues);
- Service lifetime extension;
- Risks during sea operations and during service lifetime in a multi-usage area;
- Robustness quantification of complex systems;
- Electrical grid optimization and asset management;
- Life-cycle assessment and optimization;
- Structural and mechanical reliability, including electro-mechanical systems
- Probabilistic degradation models;
- Added value of structural health monitoring and Inspection, Maintenance and Repair optimization;
- Risk assessment and decision theory;
- Computation procedures in analysis and optimization;
- Failure consequences on human lives, activities and environmental damage ;
- Organisational and societal modelling;
- Industrial case studies in Coastal Structures and Marine Renewable Energy.

SEMINAR ORGANISATION

The seminar is held by ESReDA

Chairman of the seminar

Luis Ferreria, (ESReDA President, University of Porto, Portugal)

Technical Program Committee

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