



SEA - CONF 2020 6th INTERNATIONAL CONFERENCE

Constanta,
May 22nd - 23rd, 2020



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SEA-CONF 2020 PROGRAMME

18th of May

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22nd of May

10.00-16.00 – On-line Session

- **Electrical engineering, Automation and Computer Science Section**
- **Fundamental and Applied Research, Military, Linguistics and Social Sciences Section**
- **Navigation, Transport and Management Section**
- **Mechanical Engineering Section**

23rd of May

10.00-16.00 – On-line Session (if necessary)



Eugen Rusu

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Scientific interests: ocean energy, marine engineering, coastal hazards, wave and currents modeling, wind energy.

Eugen Rusu received a diploma in Naval Architecture (1982) and a Ph.D. in Mechanical Engineering (1997). Between 1999 and 2004, he worked as a post-doc fellow at the at Hydrographical Institute of the Portuguese Navy, where he was responsible for wave modelling and provided environmental support for some major situations such as: the accident of the M/V Prestige (2002) and the NATO exercises Unified Odyssey (2002) and ‘Swordfish’ (2003). Eugen Rusu worked as a consulting Scientist at the NATO Centre for Maritime Research and Experimentation, La Spezia, Italy (2005), having modelling coastal waves and surf zone processes as main tasks.

Starting in 2006, in parallel with his activity as professor at the University Dunarea de Jos of Galati, he has been working as a professor collaborator at CENTEC (Centre for Marine Technology and Ocean Engineering)

<http://www.centec.ist.utl.pt/en/centec/personnel.aspx?id=1>, University of Lisbon, Portugal.

Since 2012, he has also acted as an expert for the European Commission. Eugen Rusu has published more than 150 works in the fields of renewable energy and marine engineering and he received awards including Doctor Honoris Causa (2015) at the Maritime University of Constanta, Romania Outstanding Contribution in Reviewing, *Renewable Energy* (2015) and *Ocean Engineering* (2016) journals; and Top 1% World Reviewers in the field of engineering (2018 and 2019). He is also the President of the Council of the Doctoral Schools in Galati University and of the Romanian National Commission of Mechanical Engineering. Since 2018, he has been a corresponding member of the Romanian Academy, the highest level scientific and cultural forum in Romania.

CHALLENGES AND ADVANCES IN EXTRACTING MARINE RENEWABLE ENERGY

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The climate changes, most probably induced by anthropogenic emissions, represents a reality that have to be faced, and effective countermeasures have to be quickly designed and implemented. From this perspective, in the present invited presentation some expected effects on the environmental conditions until the end of the 21st century under the most significant Representative Concentration Pathways (RCP4.5, RCP8.5) are presented.

As a next step, the European Union policy and some pillars of the Strategic Energy Technology (SET) Plan are discussed highlighting the increasing importance of the ocean renewables in the future energy portfolio. Some specialised organisms as the Ocean Energy Forum and the European Technology and Innovation Platform for Ocean Energy (ETIP Ocean) <https://www.etipocean.eu/> have the objective to facilitate and accelerate this process.

An important issue is to make the ocean energy extraction cost effective, which implies to reduce the Levelized Cost of Energy (LCOE) at values comparable to the onshore renewable resources. Thus, the EU LCOE targets for tidal energy are 15 cts€/kWh by 2025 and 10 cts€/kWh by 2030, while for the wave energy 15 cts€/kWh by 2030 and 10 cts€/kWh by 2035. The global tide and wave energy resources are further presented and discussed and the conclusion is that there is a huge potential of renewable energy in seas and oceans that needs to be used. Further on, a presentation of the most significant types of wave energy converters is made, highlighting the classifications after the area of operation (nearshore, shoreline and offshore) and after the operating principle (oscillating water columns, wave activated bodies, and overtopping). The fact is that there are many different technologies, but there is still a need of improvements in order to become more effective and operational viable in the harsh marine environment.

The next part of the presentation is dedicated to the offshore wind, which had a very dynamic

development in the recent years. There are already many operational wind farms, especially in the Baltic and North seas, and the LCOE was decreased in many cases to less than 7 cts€/kWh. This makes offshore wind economically effective and cheaper than for example the atomic energy. On the other hand, the very high dynamics of the offshore wind is expected to induce momentum in the development of the wave energy extraction. A first approach is represented by collocation, which means to deploy wave energy converters in the vicinity of the wind farms, taking advantage in this way of an existing infrastructure. Another approach is represented by implementing hybrid wind-wave technologies and the advantages and disadvantages of each solution are discussed. Finally, at the end of the presentation, as concluding remarks, some general advantages brought by harvesting ocean energy are also underlined.

Keywords: climate change, ocean energy, tide, waves, wind, hybrid approaches, LCOE

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