Local Communities

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IMarEST BeNeLux Branch - Technical Meeting

The GASDRIVE project:
fuelcells, gas engines, air lubrication and hull fouling

Speakers: Lindert van Biert, Harsh Sapra (TUD) and Yuzhu (Celia) Wei (Wageningen University)
Positions: PhD
Companies: TUD and WUR
Websites: www.tudelft.nl and https://www.wur.nl/
Date: Thursday 4th of April
Time: 18:30 – 22:00
Venue: Delft University of Technology – 3ME Faculty – lecture room D (James Watt)
Mekelweg 2
2628 CD Delft
Contact: IMarESTBeNeLux@gmail.com
Parking: P-Aula or P-3ME; see campus map on http://www.tudelft.nl/en/contact/.

Dear member or friend,

You are hereby cordially invited to the coming Technical Meeting of the IMarEST BeNeLux Branch.
Details of the programme and additional information can be found below. Your attendance to this Technical Meeting will be much appreciated. I look forward to seeing you on the 4th of April.

Would you kindly let me know if you plan to attend this event by registering online. Please register before Monday the 1st of April, so that we can order sufficient refreshments. Please note we have changed our policy concerning refreshments for non-members of IMarEST. We now kindly ask a contribution to refreshment costs of 5 euro's from non-members. The bank account number of IMarEST BeNeLux branch is: NL67 RABO 0364 6179 69 (no refunds).

Thank you in advance.

Yours sincerely,
Erik-Jan Boonen – Honorary Secretary IMarEST Benelux Branch.

Detailed Programme

18:30 Welcome incl. coffee; meet other attendees
19:00 Technical Presentation
19:45 (Coffee) Break
20:00 Technical Presentation
20:45 Discussion / remaining questions
21:00 Drinks / Networking event
21:45 Closure

[continue on next page]

Organised in cooperation with Marine Engineering student organisation Vulcanus

Abstract

In this lecture an overview of the various elements of the GasDrive project, including their interactions, is given.
The GasDrive project focusses on a ship power and propulsion concept which consists out of a solid oxide fuel cell and internal combustion engine, connected in series. The proposed configuration offers not only high overall energy efficiency (up to 68%) but also provides additional flexibility in the type of fuel used on-board because of the fuel cell-engine propulsion configuration. The solid oxide fuel cell can process various fuels and the gasses coming from its anode further enhance the combustion process of natural gas in an internal combustion engine. To understand the individual dynamics and overall interaction of the involved components it was necessary to perform several studies that include modelling and experimental work. The results show how to include fuel cells in future propulsions concepts that are based on fully renewable fuels and how to estimate the performance of combustion engines for different renewable fuels.
Besides a novel power and propulsion concept, the GasDrive concept also aims at reducing the amount of exhaust emissions on deck of ships by means of underwater exhaust and utilizing it to reduce ship resistance by means of air-lubrication. The air-lubrication was investigated using different hydrophobic nano-coating materials for hull coating as a way to capture the exhaust gasses and reduce the ship resistance. The effect of the underwater exhaust on the maritime eco system is investigated through series of experiments that enabled better understanding of the impact of ships on underwater organisms.

About the Speakers

Lindert van Biert
Lindert van Biert holds a shared PhD position between the departments of Maritime and Transport Technology and Process and Energy at the faculty of Mechanical, Maritime and Materials Engineering at the TU Delft. He does research on the application of alternative fuels and fuel cell systems in shipping, with a special focus on liquefied natural gas and high temperature solid oxide fuel cells (SOFCs) within the GasDrive project. Technical research topics include SOFC system integration concepts with reforming and thermal bottoming cycles, such as gas turbines and reciprocating engines, through thermodynamic system analysis, dynamic modelling of SOFC stacks, and experimental studies on the kinetics of direct internal reforming on the SOFC fuel electrode.

Harsh Sapra
Harsh Sapra is a PhD Candidate at the Faculty of Mechanical, Marine and Materials Engineering of the Delft University of Technology. He completed his masters in Mechanical System Integration from the Delft University of Technology in October 2015 and acquired his Bachelor of Mechanical Engineering degree from Pune University, India. At present, he is doing his PhD research as part of the GasDrive project which proposes a hybrid ship propulsion configuration combining a solid oxide fuel cell and a reciprocating engine employed with the underwater exhaust system. The objective of this project is to develop a highly efficient ship propulsion system with reduced emissions, drag and fuel consumption. He is currently researching the serial integration of a solid oxide fuel cell with a natural gas engine to improve engine and system efficiency by controlling the combustion of fuel cell anode-off gas in a natural gas engine for maritime applications.

Yuzhu (Celia) Wei
Yuzhu (Celia) Wei is in the third year of her PhD research as part of the GasDrive project at Wageningen University (WUR). Her PhD research focuses on the environmental impact of underwater exhaust gas from novel designed LNG powered ships in cooperation with TU Delft and TU Twente. She did her Master in Biotechnology at WUR and developed a one-week tadpoles (in vivo) assay for detecting thyroid hormone disruptors during her thesis at University of California, Davis. After that, she worked for 2 years as research assistant in WUR. During that time, her work focused on setting up bioassays for extraction and identification of the biochemical parameters in marine snow formed during oil spill disasters. In addition, she performed diatom cultivation with high silicon content and easy-to-harvest biomass for bio-cement application.