

# ASME<sup>®</sup> 2021 IOWTC

International Offshore  
Wind Technical Conference

CONFERENCE  
February 16–17, 2021

Virtual, Online

# Program

<https://event.asme.org/IOWTC>



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# ASME® 2021 IOWTC

Dear IOWTC participants, authors and committee members,

We are pleased to welcome you to the Third International Offshore Wind Technical Conference (<https://event.asme.org/IOWTC>), an online event on February 16-17, 2021. This conference replaces the in-person event that was planned for October 18 – 21, 2020 in Boston, USA. The conference follows on the successful past conferences held in San Francisco (2018) and in Malta (2019). We have 26 technical papers and an additional 6 technical presentations of very high-quality representing advances to the state-of-the-art in several topics relevant to the field of offshore wind energy. We are also especially honored to welcome our keynote speakers, **Prof. Dr. Mario Garcia-Sanz**, Program Director for Advanced Research Projects Agency, US Department of Energy, and **Dr. Leif Delp**, Head of Floating Offshore Wind Technology, Equinor ASA, Norway.

We would like to express our sincere appreciation to our Gold sponsors MARIN and Principle Power.

This conference would not have been made possible without our very loyal organizing committee, comprise of: Daniel Barcarolo, Michael Borg, Erik-Jan De Ridder, Konstantinos Gryllias, Gus Jeans, Jason Jonkman, Sam Kanner, Alex Koltsidopoulos-Papatzimos, Arjen Koop, Daniel Micallef, Amir R. Nejad, Senol Ozmutlu, Flavia Rezende, Amy Roberston, Kevin Tian, and Nathan Tom. They served as topic and session organizers, ensuring all the papers are peer-reviewed on time. This conference could not happen without this group. We are also very grateful for the volunteer support and all the reviewers.

We also acknowledge the great support from ASME staff Jamie Hart, Kim Williams and Stacey Cooper.

The presentations will be uploaded prior to the conference and you will have access to them as soon as you register. Please make sure you watch them prior to the actual session to maximize your experience. Only a quick summary of the presentations will be presented during the session, which will focus entirely on Q&A with the authors.

We hope you enjoy the presentations and the live interactions and look forward to seeing you virtually in February and meeting you in person at the Fourth IOWTC in 2022.

Sincerely,

Krish Thiagarajan Sharman (Conference Chair)

Dominique Roddier (Technical Program Chair)



# ASME® 2021 IOWTC

## Program at a Glance

Start	Finish	Tuesday, February 16, 2021		
8:00AM	8:45AM	Welcome <b>Keynote by Professor Mario Garcia-Sanz</b> “Unveiling ATLANTIS: Control Co-Design of Floating Offshore Wind”		
8:45AM	9:00AM	Break		
9:00AM	9:50AM	Session Title	Session Description	Presenter
		<b>Session: FOWT's Performance</b>		
		<b>Presentations on different type of floaters, focusing on global performance</b>		
		IOWTC2021-3503	A Reduced Order Mathematical Model for the Current-Induced Motion of a Floating Offshore Wind Turbine	Éverton L. de Oliveira
		IOWTC2021-3536	Modeling the Dynamics of Freely-Floating Offshore Wind Turbine Subjected to Waves With an Open-Source Overset Mesh Method	Romain Pinguet
		IOWTC2021-3501	Numerical Research on the Interaction of Multidirectional Random Waves With a Large-Scale Offshore Wind Turbine Foundation	Xinran Ji
		IOWTC2021-3511	Study of Motion Performance of a Floating System With Four Moonpools and Twin Vawts	TAN Lei
IOWTC2021-3561	Concept for a Wind-Yawing Shallow-Draft Floating Turbine	Jim Papadopoulos		
9:50AM	10:00AM	Break		
10:00AM	10:50AM	<b>Session: Aero-Hydro and Model tests</b>		
		<b>Presentations focusing on aero-hydro dynamics modeling and performance, including model testing.</b>		
		IOWTC2021-3537	Investigation of Nonlinear Difference-Frequency Wave Excitation on a Semisubmersible Offshore-Wind Platform With Bichromatic-Wave Cfd Simulations	Lu Wang
		IOWTC2021-3558	Verification Study on Cfd Simulation of Semi-Submersible Floating Offshore Wind Turbine Under Regular Waves	Yu Wang
		IOWTC2021-3515	A Cfd Study for Floating Offshore Wind Turbine Aerodynamics in Turbulent Inflow	Yang Zhou
		IOWTC2021-3508	Experimental Validation of a Wave Elevation Observer on a Floating Wind Turbine Model	Di Carlo, Simone
IOWTC2021-3542 *	<i>The Focal Experimental Program</i>	<i>Robertson, Amy</i>		
10:50AM	11:00AM	Break		
<b>All Times Eastern Standard</b>				



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11:00AM	11:50AM	<b>Session: Mooring and Cable Systems</b> <b>Presentations focusing on the mooring and cable systems of a FOWT</b>		
		IOWTC2021-3553	Mooring Fatigue Verification of the Windcrete for a 15 Mw Wind Turbine	Trubat, Pau
		IOWTC2021-3565	Implementation and Verification of Cable Bending Stiffness in Moordyn	Matthew Hall
		IOWTC2021-3524	Prevention of Offshore Wind Power Cable Incidents by Employing Offshore Oil/gas Common Practices	David McLaurin
<b>End of Day 1</b>				
<i>All Times Eastern Standard</i>				

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Wednesday, February 17, 2021				
8:00AM	8:45AM	Welcome <b>Keynote by Dr. Leif Delp</b> <b>"Executing large scale commercial floating offshore wind projects"</b>		
8:45AM	9:00AM	Break		
9:00AM	9:50AM	Session Title      Session Description      Presenter <b>Session: Turbine design and modeling</b> <b>Presentations focusing on the design and performance of wind Turbines</b>		
		IOWTC2021-3527	Wind Turbine Anomaly Detection Based on Bi-Directional Long Short-Term Memory Neural Network	Gryllias, Konstantinos
		IOWTC2021-3518	Numerical Design of a Floating Offshore Wind Turbine Large Scale Model for Control Purposes	Taruffi, Federico
		IOWTC2021-3516	Simplified Aerodynamic Loading Model for Idling and Parked Conditions for Floating Wind Systems Design	Armando Alexandre
		IOWTC2021-3533	Functional Requirements for the Weis Toolset to Enable Controls Co-Design of Floating Offshore Wind Turbines	Jason Jonkman
		IOWTC2021-3522	Evaluation of Deep-Water Floating Wind Turbine to Power an Isolated Water Injection System	Salles, Mauricio
		IOWTC2021-3567	Performance Analysis of Tachless Rotation Speed Estimation Methods for Condition Monitoring of Gearboxes of Offshore Wind Farm	Peeters, Cédric
		9:50AM	10:00AM	Break
<b>All Times Eastern Standard</b>				
10:00AM	10:50AM	<b>Session: Structural Design</b> <b>Presentations focusing on the structural aspects of FOWTS</b>		
		IOWTC2021-3532	A Multi-Dimensional Approach for Determination of Stress Concentration Factors in Offshore Jacket Structures	Kris Hectors
		IOWTC2021-3552	A Comparison of Time Domain Seismic Analysis Methods for Offshore Wind Turbine Support Structures: Superelement Approach Versus Integrated Approach	William Collier
		IOWTC2021-3554	Scour Effects on the Structural Integrity of Offshore Wind Turbine Monopiles	George E. Varelis
		IOWTC2021-3531 *	Digifloat: Digifloat: Creating the 1st Digital Twin of a Fowt	Bruce Martins
10:50AM	11:00AM	Break		



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11:00AM	11:50AM	<b>Session: Design basis requirements</b> <b>Presentations focusing on the inputs to the design of FOWTS</b>		
		IOWTC2021-3545	Investigation of the Capacity Factor of Weather-Routed Energy Ships Deployed in the Near-Shore	Roshamida Binti Abd Jamil
		IOWTC2021-3547	Noaa-Cfsr Offshore Wind Validation	Claudia Pizzigalli
		IOWTC2021-3564	Geo-Hazards to Floating Offshore Wind Farms in the U S Pacific Waters	Dr Tayebah Tajalli Bakhsh
		IOWTC2021-3539	Large-Scale Model Investigation for Monopile Decommissioning of Offshore Wind Turbines – Overpressure and Vibratory Pile Extraction	Nils Hinzmann
		IOWTC2021-3543 *	<i>Latest Updates to the Abs Floating Offshore Wind Turbine Guide</i>	<i>Yu, Qing</i>
<i>Note* Presentation only, no manuscript in proceedings</i>				
End of Day 2				
<b>All Times Eastern Standard</b>				



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## Keynote Speakers



**Professor Mario Garcia-Sanz**

**Keynote Topic:** "Unveiling ATLANTIS: Control Co-Design of Floating Offshore Wind"

**Biography:** Prof. Mario Garcia-Sanz is currently a Program Director at ARPA-E, with the U.S. Department of Energy. He is an expert on control systems, and a veteran of the European wind energy industry. He has straddled academia and industry, having held appointments at

the University of Manchester, Oxford University, NASA Jet Propulsion Laboratory, the European Space Agency, the Public University of Navarra, CEIT research center and Case Western. He worked as a Senior Advisor for many European wind energy companies, electrical utilities, and corporations, and holds over 20 patents, published over 250 research papers, and written three books. He has been the principal investigator of over 50 industry research projects. At ARPA-E he proposed and developed the ATLANTIS Program on floating offshore wind, the SHARKS Program on tidal and riverine energy, and is leading the efforts on grid technology with the NODES Program and microgrid research.



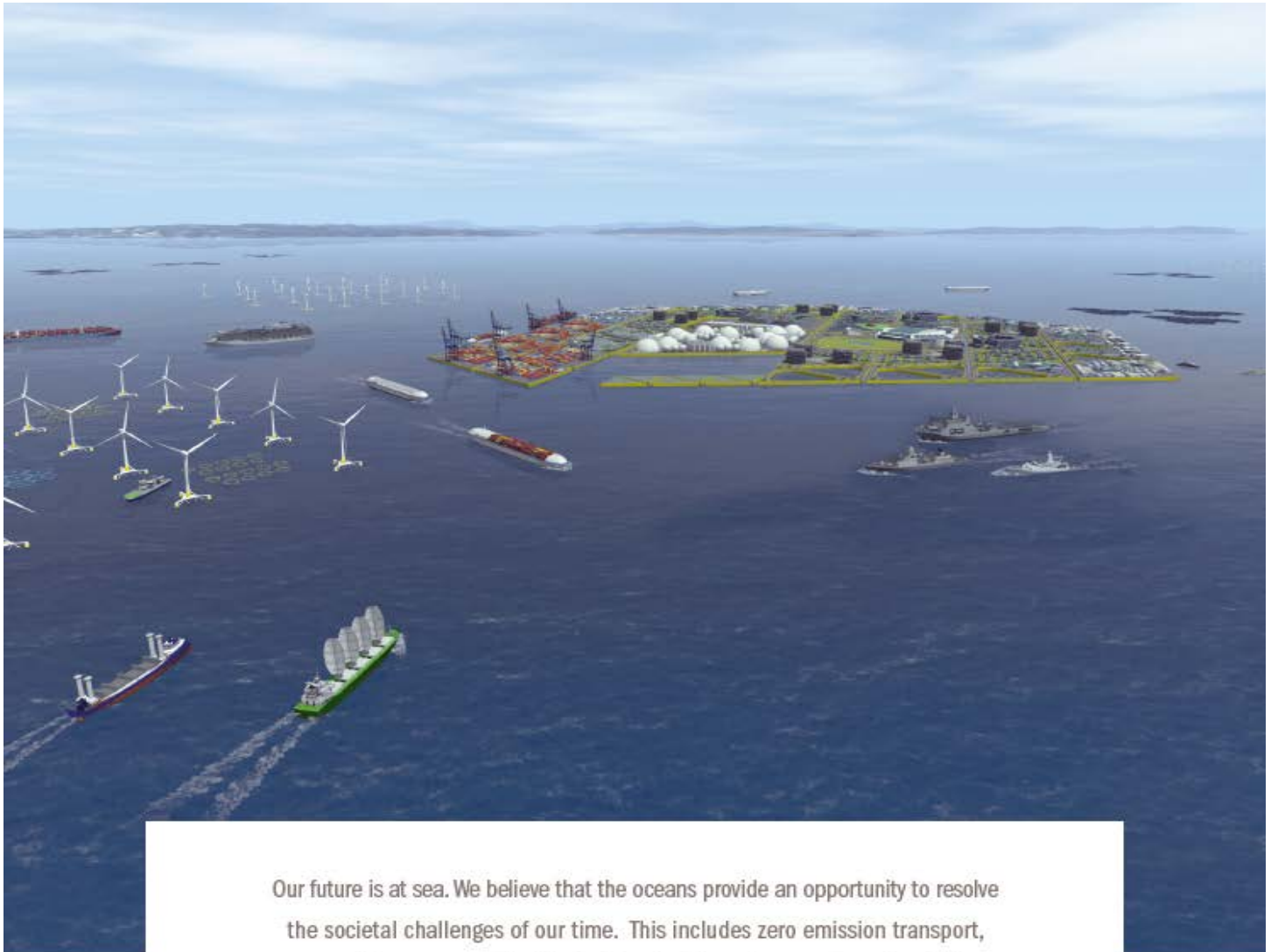
**Leif Delp**

**Keynote Topic:** "Executing large scale commercial floating offshore wind projects"

**Biography:** Leif Delp is head of Floating Offshore Wind Technology at Equinor.



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## Scientific Track (TRK-1)

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### 1-1 3rd International Offshore Wind Technical Conference

#### [IOWTC2021-3511](#)

Study of Motion Performance of a Floating System With Four Moonpools and a VAWT

*Lei Tan* — Nihon University  
*Satsuya Moritsu* — Nihon University  
*Tomoki Ikoma* — Nihon University  
*Yasuhiro Aida* — Nihon University  
*Koichi Masuda* — Nihon University

#### [IOWTC2021-3522](#)

Evaluation of Deep-Water Floating Wind Turbine to Power an Isolated Water Injection System

*Khalid S. Khan* — University of São Paulo  
*Isabelle V. M. dos Santos* — University of São Paulo  
*Guilherme B. dos Santos* — University of São Paulo  
*Maurício B. C. Salles* — University of São Paulo  
*Renato M. Monaro* — University of São Paulo

#### [IOWTC2021-3545](#)

Investigation of the Capacity Factor of Weather-Routed Energy Ships Deployed in the Near-Shore

*Roshamida Abd Jamil* — Ecole Centrale de Nantes  
*Jean-Christophe Gilloteaux* — Ecole Centrale de Nantes  
*Philippe Lelong* — MELTEMUS  
*Aurélien Babarit* — Ecole Centrale de Nantes

### 1-2 Floating Concepts

#### [IOWTC2021-3508](#)

Experimental Validation of a Wave Elevation Observer on a Floating Wind Turbine Model

*Simone Di Carlo* — Politecnico di Milano  
*Alessandro Fontanella* — Politecnico di Milano  
*Alan Facchinetti* — Politecnico di Milano  
*Sara Muggiasca* — Politecnico di Milano  
*Federico Taruffi* — Politecnico di Milano  
*Marco Belloli* — Politecnico di Milano

#### [IOWTC2021-3561](#)

Concept for a Wind-Yawing Shallow-Draft Floating Turbine

*J. M. Papadopoulos* — Northeastern University  
*C. Qiao* — Northeastern University  
*A. T. Myers* — Northeastern University



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## **IOWTC2021-3564**

Potential Geo-Hazards to Floating Offshore Wind Farms in the US Pacific

*Tayebeh Tajalli Bakhsh* — RPS Ocean Sciences

*Kent Simpson* — RPS Energy

*Tony LaPierre* — RPS Energy

*Mahmud Monim* — RPS Ocean Sciences

*Jason Dahl* — University of Rhode Island

*Malcolm Spaulding* — University of Rhode Island

*Jill Rowe* — RPS Ocean Sciences

*Jennifer Miller* — Bureau of Ocean Energy Management

*Daniel O'Connell* — Bureau of Ocean Energy Management

## **1-3 Mooring and Foundation Design**

### **IOWTC2021-3501**

Numerical Research on the Interaction of Multidirectional Random Waves With a Large-Scale Offshore Wind Turbine Foundation

*Xinran Ji* — Hainan University

*Daoru Wang* — Hainan Academy of Ocean and Fisheries Sciences

### **IOWTC2021-3553**

Mooring Fatigue Verification of the WindCrete for a 15 MW Wind Turbine

*Pau Trubat* — UPC-Barcelona-Tech

*Climent Molins* — UPC-Barcelona-Tech

*Daniel Alarcon* — UPC-Barcelona-Tech

*Valentin Arramounet* — INNOSEA

*Mohammad Youssef Mahfouz* — USTUTT

## **1-5 Aero-Hydro Modeling**

### **IOWTC2021-3503**

A Reduced-Order Mathematical Model for the Current-Induced Motion of a Floating Offshore Wind Turbine

*Éverton L. de Oliveira* — University of São Paulo

*Celso P. Pesce* — University of São Paulo

*Bruno Mendes* — University of São Paulo

*Renato M. M. Orsino* — University of São Paulo

*Guilherme R. Franzini* — University of São Paulo

### **IOWTC2021-3515**

A CFD Study for Floating Offshore Wind Turbine Aerodynamics in Turbulent Wind Field

*Yang Zhou* — University of Strathclyde

*Qing Xiao* — University of Strathclyde

*Yuanchuan Liu* — Ocean University of China

*Atila Incecik* — University of Strathclyde

*Christophe Peyrard* — Université Paris-Est

*Decheng Wan* — Shanghai Jiao Tong University

*Sunwei Li* — Tsinghua University



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## IOWTC2021-3518

Numerical Design of a Floating Offshore Wind Turbine Large Scale Model for Control Purposes

*Federico Taruffi* — Politecnico di Milano

*Simone Di Carlo* — Politecnico di Milano

*Sara Muggiasca* — Politecnico di Milano

*Alessandro Fontanella* — Politecnico di Milano

## IOWTC2021-3533

Functional Requirements for the WEIS Toolset to Enable Controls Co-Design of Floating Offshore Wind Turbines

*Jason Jonkman* — National Renewable Energy Laboratory

*Alan Wright* — National Renewable Energy Laboratory

*Garrett Barter* — National Renewable Energy Laboratory

*Matthew Hall* — National Renewable Energy Laboratory

*James Allison* — University of Illinois at Urbana-Champaign

*Daniel R. Herber* — Colorado State University

## IOWTC2021-3536

Modeling the Dynamics of Freely-Floating Offshore Wind Turbine Subjected to Waves With an Open-Source Overset Mesh Method

*Romain Pinguet* — Aix Marseille University

*Sam Kanner* — Principle Power Inc.

*Michel Benoit* — Aix Marseille University

*Bernard Molin* — Aix Marseille University

## IOWTC2021-3537

Investigation of Nonlinear Difference-Frequency Wave Excitation on a Semisubmersible Offshore-Wind Platform With Bichromatic-Wave CFD Simulations

*Lu Wang* — National Renewable Energy Laboratory

*Amy Robertson* — National Renewable Energy Laboratory

*Jason Jonkman* — National Renewable Energy Laboratory

*Yi-Hsiang Yu* — National Renewable Energy Laboratory

*Arjen Koop* — Maritime Research Institute Netherlands

*Adrià Borràs Nadal* — IFP Energies nouvelles

*Haoran Li* — Norwegian University of Science and Technology

*Wei Shi* — Dalian University of Technology

*Romain Pinguet* — Principle Power, Inc.

*Yang Zhou* — University of Strathclyde

*Qing Xiao* — University of Strathclyde

*Rupesh Kumar* — University of Ulsan

*Hamid Sarlak* — Technical University of Denmark

## IOWTC2021-3546

Integrated Modeling and Coupled Analysis of a New Hybrid Platform Combined With WEC Under Real Metocean Condition

*Swarnadip Dey* — National Institute of Technology Durgapur

*Atul Krishna Banik* — National Institute of Technology Durgapur

*Arghya Pramanik* — National Institute of Technology Durgapur

*Sravya Anke* — National Institute of Technology Durgapur



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## **IOWTC2021-3558**

Verification Study of CFD Simulation of Semi-Submersible Floating Offshore Wind Turbine Under Regular Waves

*Yu Wang* — Texas A&M University  
*Hamn-Ching Chen* — Texas A&M University  
*Guilherme Vaz* — WavEC-Offshore Renewables  
*Simon Mewes* — University of Duisburg-Essen

## **IOWTC2021-3565**

Implementation and Verification of Cable Bending Stiffness in MoorDyn

*Matthew Hall* — National Renewable Energy Laboratory  
*Senu Sirmivas* — National Renewable Energy Laboratory  
*Yi-Hsiang Yu* — National Renewable Energy Laboratory

## **1-6 Structural Analysis**

### **IOWTC2021-3532**

A Multidimensional FEA Approach for Determination of Hot Spot Stresses in Offshore Jacket Structures

*Kris Hectors* — SIM vzw  
*Hasan Saeed* — Ghent University  
*Wim De Waele* — Ghent University

### **IOWTC2021-3552**

A Comparison of Time Domain Seismic Analysis Methods for Offshore Wind Turbine Structures: Superelement Approach Versus Integrated Approach

*William Collier* — DNV GL  
*Laurens Alblas* — DNV GL  
*Jiang Hai Wu* — DNV GL

### **IOWTC2021-3554**

Scour Effects on the Structural Integrity of Offshore Wind Turbine Monopiles

*George E. Varelis* — Intecsea  
*Jun Ai* — Intecsea  
*Prasad Kane* — Intecsea  
*Hossam Ragheb* — iMecha  
*Elie Dib* — Intecsea

## **1-7 Metocean**

### **IOWTC2021-3547**

NOAA-CFSR Offshore Wind Validation

*Claudia Pizzigalli* — Saipem Spa  
*Giancarlo Giovanetti* — Saipem Spa  
*Lisa Pedinelli* — Università delle Marche  
*Roberto Padilla-Hernandez* — IMSG-NOAA/NCEP/EMC



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## 1-10 Offshore Wind Turbine Drivetrains

### IOWTC2021-3527

An Improved 2DCNN With Focal Loss Function for Blade Icing Detection of Wind Turbines Under Imbalanced SCADA Data

*Dandan Peng* — KU Leuven

*Chenyu Liu* — KU Leuven

*Wim Desmet* — KU Leuven

*Konstantinos Gryllias* — KU Leuven

### IOWTC2021-3567

Performance Analysis of Tacholeless Rotation Speed Estimation Methods for Condition Monitoring of Gearboxes of Offshore Wind Farm

*Cédric Peeters* — Vrije Universiteit Brussel

*Jérôme Antoni* — INSA-Lyon

*Quentin Leclère* — INSA-Lyon

*Jan Helsen* — Vrije Universiteit Brussel



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## Project Development Track (TRK-2)

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### 2-2 Design and Operational Challenges

#### [IOWTC2021-3516](#)

Simplified Aerodynamic Loading Model for Non-Production Conditions for Floating Wind Systems Design

*Armando Alexandre* — Naval Energies

*Raffaello Antonutti* — Naval Energies

*Theo Gentils* — Naval Energies

*Laurent Mutricy* — Naval Energies

*Pierre Weyne* — Naval Energies

#### [IOWTC2021-3524](#)

Prevention of Offshore Wind Power Cable Incidents by Employing Offshore Oil/Gas Common Practices

*David McLaurin* — Intecsea (Worley)

*Alan Aston* — Intecsea (Worley)

*John Brand* — Intecsea (Worley)

### 2-3 REFOS

#### [IOWTC2021-3539](#)

Large-Scale Model Investigation for Monopile Decommissioning of Offshore Wind Turbines: Overpressure and Vibratory Pile

*Nils Hinzmann* — Technische Universität Braunschweig

*Patrick Lehn* — Technische Universität Braunschweig

*Jörg Gattermann* — Technische Universität Braunschweig





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