



SITHIK ALIYAR

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CAREER VISION

As a dedicated professional, my ambition lies in the dynamic field of renewable energy, with a specific focus on wind and wave energy solutions. I am deeply committed to advancing the transition toward a sustainable future by harnessing the limitless power of renewables. With a proven track record and a passion for reducing carbon footprints, I aspire to contribute my expertise towards creating innovative and impactful renewable energy projects that address our global environmental challenges and drive positive change

EDUCATION

Doctor of Philosophy <i>Ocean Engineering (Wave structure interaction)</i> GPA: 9.21/10	05/01/2018 – 10/11/ 2022
LHEEA, Ecole Centrale Nantes and Indian Institute of Technology, Madras	France & India
Master of Technology <i>Offshore structural Engineering</i> GPA: 8.4/10	01/08/2013 – 01/08/2015
Indian Institute of Technology, Madras	Tamil Nadu, India
Bachelor of Engineering <i>Civil Engineering</i> GPA: 8.3/10	23/08/2009 – 01/08/2013
Government College of Engineering, Erode	Tamil Nadu, India

PRESENT POSITION

Marie Curie PostDoctoral researcher (MSCA-PF) <i>Floating Wind Turbines</i>	01/01/2025 - 31/12/2026
DTU Wind and Energy Systems, Technical University of Denmark	Denmark
PostDoctoral researcher <i>Offshore fixed and floating Wind Turbines</i>	01/10/2022 – 31/12/2024
DTU Wind and Energy Systems, Technical University of Denmark	Denmark

My main activities revolve around experiments and code development for floating wind substructures, also participate in a number of national, EU, and commercial projects. I teach and organize postgraduate-level MSc and PhD courses, as well as supervising postgraduate students.

TEACHING COURSES

Offshore wind energy <i>Physical and Online course</i>	2023-2025
DTU Wind and Energy Systems, Technical University of Denmark	Denmark
Offshore wind farm planning <i>Online course</i>	2023-2025
DTU Wind and Energy Systems, Technical University of Denmark	Denmark
Control of floating wind turbines <i>1 Week PhD Summer school</i>	2023-2025
DTU Wind and Energy Systems, Technical University of Denmark	Denmark

Marie-Curie PostDoctoral Fellowship: "FloatingWindExcel"

01/01/2025 – 31/12/2026

- Fast CFD solver: SWENSE code development and validation
- Operation and maintenance for floating wind turbine: Floater and boat interaction multibody experiment and numerical reproduction
- Coupling of high fidelity code with medium fidelity aeroelastic software (OpenFOAM+HAWC2/OpenFAST)

"Grand Solutions 2022": A Green research, technology development, and innovation 27/04/2023 – 31/12/2024

- Investigation of 3D-directional irregular/focusing waves interaction with the TetraSPAR in both OpenFOAM and potential code-based solvers
- Two Physical Model test campaign
- Heave plate investigation for the TetraSPAR and its importance
- Slamming investigation in floating wind turbines and its validation

EU "Horizon2020" COREWIND: "Building a low carbon, Clean and Efficient Energy" 01/10/2022 – 31/05/2023

- Towing investigation of the heaviest and longest concrete-based windcrete SPAR in different wave and current conditions
- Upending of Spar type FOWT in waves: A numerical comparison with time-domain and frequency-domain solvers

"Grand Solutions 2018": Innovation Fund Denmark: FLOATSTEP

02/01/2023 – 31/05/2023

- Validated the rigid body solver 'FloatStepper' (open source OF solver, which avoids added mass instability in CFD) and enhanced the model to incorporate various types of waves, including mooring, to make the solver more versatile
- Validate the phase separation principle in CFD and experiment to investigate the second-order forces acting on the TetraSPAR floater
- Simulating the interaction between slamming and focusing waves with the TetraSPAR solver using the OpenFOAM CFD solver

Numerical modeling of extreme wave structure interaction with a moored FOWT 02/01/2021 – 01/04/2022

- A strategic coupling between Potential Theory, Navier Stokes / SWENSE, floating body dynamics, and mooring for wave interaction problem is developed
- A static mooring model based on a linear stiffness matrix and a dynamic mooring model using the MoorDyn solver is coupled with an OpenFOAM-based Navier Stokes solver and OpenFOAM-based SWENSE solver
- Further, simulated motions and mooring tensions of the moored floating SPAR in regular and irregular waves compared with the experiments and validated
- It is interesting to find that in the heave-free decay, mooring-driven damping accounts for nearly 25% of overall damping proving the importance of dynamic mooring model requirement
- Mooring in the form of a stiffness matrix provides an accurate comparison for wave cases with mild and moderate amplitudes. However, to address mild, moderate, and even severe sea state conditions with both regular and irregular waves, dynamic mooring models have proven to be vital

Validation of efficiency and accuracy of domain and functional decomposition strategies 01/07/2019 – 31/12/2020

- The focused nonbreaking and breaking wave interaction with fixed and moving cylinder (resembling current) is developed and validated
- Hybrid coupling procedures based domain decomposition and functional decomposition are compared
- The Richardson extrapolation technique along with cross-correlation is applied to study the grid convergence
- Both the OpenFOAM based solvers, *foamStar* and *foamStarSWENSE* appear to capture the flow behaviors and force over the cylinder well even with the coarsest mesh
- Further validation is carried out for application of breaking wave interaction and moving cylinder wave interaction at two different forward speeds

Experimental investigation of installation of an OWT jacket in regular waves

01/06/2018 – 01/06/2019

- The upending of the heavy jacket structure in regular waves is investigated for three upending positions: 16, 45, and 90 deg, in head and beam sea conditions
- The peak force experienced by the crane at 16 deg is 1.5 to 2 times higher than the rest
- RAOs of all motions decrease by 2 to 2.5 times when the jacket is connected to the crane
- Max. peak force was found to be 3 times the weight of the jacket in the initial position

Numerical investigation with Meshless Local Petrov Galerkin Method ($MLPG_R$)

01/07/2017 – 31/12/2017

- To more consistently and efficiently estimate the pressure and its gradient in the $MLPG_R$ method, a new interpolation scheme named Simplified Finite Difference Scheme (SFDD) was used
- The method was redeveloped into Quadratic SFDD including higher order terms in the interpolation technique
- The method is tested and validated for the different applications

Use of Wave Energy Converter as Motion Suppressor

02/01/2015 – 31/07/2015

- Hybrid Coupling between WEC and FOWT is planned such as instead of dissipating the wave energy, the WEC absorbs it and also reduces platform motion in the meantime
- WEC of shape to Salter's Duck was chosen and modified
- For various sea state conditions, this modified Salter's Duck is modeled and analyzed. It has been identified that the modified Duck form can absorb up to 90% of wave energy
- A different arrays of WEC converters were placed around the Trifloater wind turbine and its response reduction is investigated and reported

Experimental Investigation of Slurry Infiltrated Fibrous Concrete (SIFCON)

02/01/2013 – 30/06/2013

- Based on the investigation, significant conclusions have arrived which show that the SIFCON structural elements, such as beams, slabs, and wall panels, behave relatively better than conventional concrete in all aspects (mainly for blast loading)

Dynamic analysis to study the stability of roads during earthquakes

SRFP - 01/06/2012 – 05/08/2012

- To simulate the earthquake-induced deformations of the roads using the PLAXIS
- Then the behavior of the simulated road in the design and its displacement was compared with the original photographs and validated
- RDS-Road damage scale prediction is proposed for roads damaged in earthquakes

INDUSTRIAL EXPERIENCE

Offshore Structural Engineer, Larsen & Toubro Hydrocarbon Engineering Limited

01/07/2015 – 31/12/2015

- Design of Spool Base setup, Skid load out for Pipe reeling facility for LTHE
- Responsible for doing Heavy Lifting – Roll up of panels, Mud mat, Buoyancy tanks for 4,8 Legged Jackets
- Responsible for developing the SACS & STADD PRO computer models, design and detailing of structural Elements for vertical & lateral effects as per API, AISC standards for Loadout and Lifting purposes
- Responsible for preparation of BOQ and structural shop and Field drawings

Project Coordinator, Larsen & Toubro Hydrocarbon Engineering Limited

02/01/2016 – 31/12/2016

- *Implementation of Geo sack as Sand Barrier for controlling coastal erosion for the first time in India*
- Design for Modification of existing Jetty and New Jetty based on Indian Standards (In House Team) using STAAD Pro
- Planning and Scheduling of both the Projects simultaneously using PRIMAVERA
- Quality control of Materials, Workmanship, and Documentation of both the Projects

Coastal Design Engineer, Larsen & Toubro Infrastructure Engineering Limited

02/01/2017 – 30/06/2017

- Design of LNG Terminal for JSW in Jaigarh port INDIA

INDUSTRIAL PROJECTS WORKED

- Additional Development of Vasai East -VSEC, VSEB, BCPA 3, BLQ 3- Three 4 Legged Jackets, One 8 Legged Jacket
- Rehabilitation of existing Jetty in MFF Kattupalli, Chennai, India for 85m
- New Jetty of 65m in same MFFK based on Rock bund Construction
- JSW LNG Terminal, Mumbai, India - Structural Design

ACHIEVEMENTS

- Awarded the prestigious **Marie Skłodowska-Curie Postdoctoral Fellowship** (2024–2026) for advancing hydrodynamic modeling and floating wind operational strategies, funded by the European Commission
- **EAWC Scholarship 2024** from European Academy of Wind Energy
- **FoamU conference 2025** : Best Poster presentation award
- European Energy Research Alliance Deepwind, Norway 2023: Best Communication award (<https://www.deepwind.no/poster-awards/>)
- An awardee of Indo-French Joint doctoral program (dual doctorate) between IITM and ECN

- Ranked in Top 3% among 67000 prospective applicants in the most competitive GATE entrance exam 2013
- Fellow of Summer Research fellowship program(SRFP) at Indian Institute of Science Bangalore 2012 (Ranked in top 1% among 11000 prospective applications)
- Best outgoing student of the Year 2013 (Out of 400 students)
- Received 50+ awards for paper and poster presentation for my work in “Slurry Infiltrated Fibre reinforced concrete” across India
- Trained more than 1000+ students to clear GATE Civil Engineering exam, India

CONFERENCES

- Presented “**Breaking focused wave interaction with cylinder using HOS-OpenFOAM coupling**” at IEEE OCEANS, IIT Madras, India, 21/02/2022 – 24/02/2022
- Presented Poster on “**Upending of Spar type FOWT in waves: A numerical comparison with time-domain and frequency-domain solvers**” at European Energy Research Alliance **Deepwind**, Norway, 17/01/2023 – 19/01/2023
- Presented “**CFD analysis of the installation of floating wind SPAR substructure in waves**” at Wind Energy Science Conference (**WESC**), Glasgow, 23/05/2023 – 26/05/2023
- Presented “**Floating wind turbine response to directionally spread storm waves, first results of FloatLab project**” at European Energy Research Alliance **Deepwind**, Norway, 17/01/2024 – 19/01/2024
- Presented “**Robust CFD analysis of floating wind turbine wave responses with the FloatStepper algorithm**” at OMAE, Singapore, 09/06/2024 – 14/06/2024
- Presented Poster on “**Force analysis of heave plate dynamics with stochastic motion in irregular waves**” at European Energy Research Alliance **Deepwind**, Norway, January 2025
- Presented Poster on “**Long-term wave propagation in CFD-based numerical wave tank with domain and functional decomposition**” at FoamU, Von Karman Institute, Belgium, April 2025
- Presented “**CFD modeling of stochastic heave plate motions in irregular waves: Focus on nonlinear interactive forces**” at Wind Energy Science Conference (**WESC**), Nantes, France, June 2025
- Presented “**SWENSE-Based CFD: A faster approach to wave structure simulations**” at OpenFOAM Workshop, vienna, Austria, July 2025

PUBLICATIONS

- (Upcoming Submission) Aliyar, Sithik, Henrik Bredmose “*JFM: Experimental Study of Heave Plate Dynamics with Stochastic Motion in Irregular Waves: Decomposition of Higher-Order Harmonic Forces*” Journal of Fluid Mechanics, 2025
- Aliyar, Sithik, Bredmose, H., Roenby, J., Tomaselli, P. D., & Sarlak, H. (2025) “*Directional focused wave group response of a floating wind turbine: Harmonic separation in experiments and CFD*”. Renewable Energy, 123516.
- Aliyar, Sithik, Pierella, F., Roenby, J., Tomaselli, P. D., & Bredmose, H. (2024, June). “*Robust CFD Analysis of Floating Wind Turbine Wave Responses With the FloatStepper Algorithm*”. In International Conference on Offshore Mechanics and Arctic Engineering (Vol. 87844, p. V006T08A034). American Society of Mechanical Engineers.
- Roenby, J., Aliyar, Sithik, & Bredmose, H. (2024). “*A robust algorithm for computational floating body dynamics*”. Royal Society Open Science, 11(4), 231453.
- Poster on Aliyar, Sithik, Fabio Pierella, Henrik Bredmose, Pau Trubat and Climent Molins. “*Upending of Spar type FOWT in waves: A numerical comparison with time-domain and frequency-domain solvers*” EERA Deepwind conference 2023
- Aliyar, Sithik, Guillaume Ducrozet, Benjamin Bouscasse, Sriram Venkatachalam, and Pierre Ferrant. “*Numerical coupling strategy using HOS-OpenFOAM-MoorDyn for moored SPAR type FOWT*” Ocean Engineering, pp. 1-30. 2022.
- Aliyar, Sithik, Guillaume Ducrozet, Benjamin Bouscasse, Sriram Venkatachalam, and Pierre Ferrant. “*Efficiency and accuracy of domain and function decomposition strategies for wave structure interaction problem*” Ocean Engineering, pp. 1-30. 2022.

- **Aliyar, Sithik**, Guillaume Ducrozet, Benjamin Bouscasse, Sriram Venkatachalam, and Pierre Ferrant. *"Breaking focused wave interaction with cylinder using HOS-OpenFOAM coupling"* In OCEANS 2022-Chennai, pp. 1-10. IEEE, 2022.
- Shagun Agarwal; Shaswat Saincher; V. Sriram; Shiqiang Yan; Zhihua Xie; Torsten Schlurmann; Qingwei Ma; Xiaotong Yang; Decheng Wan; Jiaye Gong; Yunbo Li; Yanyan Li; Jinshu Lu; Hanbing Sun; Yan Liu; Beilei Zou; Shuling Chen; Jing Lu; Jianguo Lin; Sa Young Hong; Yoon-Jin Ha; Kyong-Hwan Kim; Seok-Kyu Cho; Dong-Min Park; **Aliyar Sithik**; Benjamin Bouscasse; Guillaume Ducrozet; Pierre Ferrant . *"A Comparative Study on the Nonlinear Interaction Between a Focusing Wave and Cylinder Using State-of-the-art Solvers: Part B"* International Journal of Offshore and Polar Engineering. 31 (01): 11–18. <https://doi.org/10.17736/ijope.2021.jc832> Paper Number: IJOPE-21-31-1-011
- **Aliyar, Sithik**, Jannik Meyer, V. Sriram, and Arndt Hildebrandt. *"Experimental investigation of offshore crane load during installation of a wind turbine jacket substructure in regular waves"* Ocean Engineering 241 (2021): 109979

POSITIONS OF RESPONSIBILITY

Coordinator and Teacher, PhD Summer school	2023,2024 & 2025
DTU Wind and System Engineering	Denmark
Coordinator and volunteer, IEEE OCEANS conference	2022
IIT Madras	Tamil Nadu, India
Coordinator and volunteer, ICOE conference	2018
IIT Madras	Tamil Nadu, India
Secretary, Department of Civil Engineering	2013
GCE, Erode	Tamil Nadu, India

RELEVANT COURSES

Wave Hydrodynamics, Analysis of offshore structures, Design of fixed offshore structures, Design of floating structures, FEM applied to ocean engineering, Foundation of offshore structures, Installation of offshore structures, Materials and fabrication of offshore structures, Numerical modeling of offshore structures, Pipelines and riser engineering, Statics and dynamics of offshore structures

SKILLS

Languages: English, Tamil, Malayalam, Hindi, French, Danish (Beginner)

Technical Softwares

- **CFD & Hydrodynamics** : OpenFOAM, ANSYS-FLUENT, STARCCM+, ANSYS-AQWA, WAMIT
- **Aerodynamics** : HAWC2, OpenFAST
- **Mooring** : MAP, MoorDyn, ORCAFLEX
- **Structural analysis** : STADD PRO, SACS, SEASAM, ABAQUS, ANSYS
- **Geotechnical analysis** : PLAXIS
- **Modelling Packages** : AutoCAD, RHINO, SolidWorks, SALOME
- **Numerical analysis** : MATLAB, Python, MATHEMATICA
- **Programming** : C++, FORTRAN

Document Creation: LaTeX, Microsoft Office Suite