

Ahmed Atef Abdelsatar Ahmed Hamada



Ph.D. Research Candidate at The University of Texas at Dallas



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EDUCATION

January 2019 -
Present

Degree: Ph.D. in Mechanical Engineering
Location: The University of Texas at Dallas (UTD)
Texas A&M University (TAMU) (Transfer to UTD in Fall 2024)
Stevens Institute of Technology (Transfer to TAMU in Fall 2020)
GPA: 4.00
Advisor: Assistant Professor **Kianoosh Yousefi**
Dissertation Topic: Navigating the Turbulent Seas: Unraveling Flow Dynamics in Offshore Wind Turbines amidst Wake-Wind-Wave Interactions
Tool: Experiment, Deep Learning, Home-built codes & OpenFOAM

March 2017 - May
2023

Degree: M.Sc. in Aerospace Engineering
Location: Cairo University, Giza, Egypt
GPA: 3.90
Advisors: Professor **Mohamed Madbouli Abdelrahman**
Professor **Amr Gamal Guaily**
Dissertation Title: Active Flow Control Using a Morphing Bump For A Transonic Flow Over An Airfoil
Tool: Home-built FEM MATLAB code & OpenFOAM

September 2011 -
June 2016

Degree: B.Sc. in Aerospace Engineering
Location: Cairo University, Giza, Egypt
GPA: **Distinction Honors**, 88.73%
Advisor: Professor **Mohamed Madbouli Abdelrahman**
Grad. Project Title: Design a Flying Wing
Tool: Home-built FDM MATLAB code, Mathematica, ANSYS, XFLR5, & Wind Tunnel Experiment

Ph.D. courses

Fluid Dynamics for Ocean & Environmental Engineering.	Intro to Ship Design & Building.
Hydrodynamics of High-Speed Marine Craft.	Turbulence and Turbulent Flows.
Mathematics Methods in Science & Engineering II.	Hydrodynamics.
Numerical Methods in Mechanical Engineering.	Advanced Aerodynamics
Computational Fluid Dynamics-Aerospace Applications.	Turbulence Modeling.
Ocean Experiments & Oceanographic Measurements.	Turbulence Processes.
Nonlinear Hydrodynamic Problems.	Computational Aerodynamics.
Intro to Validation, Verification, & Uncertainty Quantity.	High-Performance CFD.
Deep Learning for Petroleum Engineering Using Python.	Professional Development STEM.

M.Sc. courses

Finite Element Method in Fluid Mechanics (FEM).	Computational Aerodynamics (FDM).
Technical Writing for Scientific Publications.	Advanced Numerical Analysis.
Experimental Methods in Aerospace Engineering.	Aero Elasticity.
Numerical Methods in Propulsion Systems (FVM).	Selected Topics in Aerodynamics.
Modern Control of Flight Systems (Multi-Variable Control).	

RESEARCH EXPERIENCE

August 2020 - December 2023 - TAMU	Position: Locations: Lab:	Graduate Research Assistant Texas A&M University Stevens Institute of Technology Fürth Laboratory
January 2019 - July 2020 - Stevens	Advisor: Projects:	Assistant Professor Mirjam Fürth Hydrokinetic Flapping Foil Turbines, Point Wave Energy Converters, Oscillating Cylinder, and Planing High-Speed Crafts.

Contributions

- Developed a home-built code designed for investigating hydrokinetic energy converters.
- Investigated the hydrodynamics of Leading-Edge Vortex (LEV) over a flapping foil in swing-arm mode.
- Investigated the impact of varying the foil shape parameters on the Leading-Edge Vortex (LEV) and power extraction throughout the flapping cycle in swing-arm mode.
- Developed a deformable Overset mesh technique in OpenFOAM for flexible flapping foils.
- Implemented the PANS turbulent modeling technique in OpenFOAM.
- Proposed a numerical towing tank for the planing high-speed craft using a turbulent PANS model.
- Investigated the effect of buoy shape on the power-generating ability in a point wave energy converter.
- Investigated the effect of changing the wave characteristics on the power-generating ability of the spheroid buoy system.
- Helped in writing grant proposals.

Research Skills and Interests

Personal:	Presentation skills, Time management, Planning skills, and Leadership
Programming:	- Proficient in Fortran, OpenFOAM, Mathematica, C++, GitHub, Python, Bash, Linux HPCFD, SLURM, LATEX, OpenFAST, NEMOH, & Matlab, R, TensorFlow, Keras.
Software:	- Proficient in SolidWorks and AutoCAD - Good in Fluent ANSYS
Interests:	- Ocean and Wind Renewable Energy Applications, such as Wave Energy Converters, Hydrokinetic Turbines, and Floating Offshore Wind Turbines. - Supersonic and Transonic Flow Applications, such as Morphing Bump over a Transonic Airfoil and Moving Supersonic Intakes. - High-fidelity turbulence modelings, such as PANS and LES. - Developing CFD Tools/Codes. - Fluid-Structure Interaction Simulations - Numerical and Experimental Wind and Wave Tanks. - Planning High-Speed Crafts.

Research Collaborations

March 2023 - May 2024	Project: Advisors: Description:	Ship Hull Optimization Assistant Professor Mirjam Fürth, TAMU Professor Antony Jameson, TAMU Professor Luigi Martinelli, Princeton University Developing codes and investigating related phenomena.
January 2023 - August 2023	Project: Advisors: Description:	Turbulent PANS Model Assistant Professor Mirjam Fürth, TAMU Professor Sharath Girimaji, TAMU Implemented different turbulent PANS models in OpenFOAM and performed validation simulations.
May 2022 - March 2024	Project: Advisors: Description:	Modified OverSet Mesh in OpenFOAM Assistant Professor Mirjam Fürth, TAMU Professor Ludovic Chatellier, Université de Poitiers - Developed a modified OverSet meshing technique to simulate deformable moving bodies, such as flexible flapping foils. - Improving the coupling library between OpenFOAM and PreCICE to perform a Fluid-Solid Interaction (FSI) simulation.

Research Mentoring/Co-Advising

Mentoring/co-advising students in conducting numerical simulations and publishing papers.

January 2021 - May 2023	Project: Students: Main Advisor:	Point Wave Energy Converters Junior/Senior Students at Ocean Eng. Dept., Texas A&M Univ. Assistant Professor Mirjam Fürth
September 2021 - January 2024	Project: Students: Main Advisor:	Heat Transfer from an Open-Ended Vertical Channel M.Sc. Student at Chemical Eng. Dept., Alexandria Univ. (Remotely) Assistant Professor Mahmoud Taha Moharam
September 2022 - October 2023	Project: Students: Main Advisors:	Machine Learning in CFD of Transonic Flow over an Airfoil Senior/M.Sc. Students at Aerospace Eng. Dept., Cairo Univ. (Remotely) Professor Mohamed Madbouli Abdelrahman DR. Mahmoud Ayyad

TEACHING EXPERIENCE

January 2024 - May 2024	Position: Location: Courses:	Lecturer Texas A&M University OCEN 362 Hydrodynamics (Junior Level)
August 2023 - December 2023	Position: Location: Course: Advisor:	Graduate Teaching Assistant Texas A&M University AERO 689 Computational Aerodynamics (Graduate Level, 15 students) Professor Antony Jameson
January 2023 - May 2023	Course: Advisor:	OCEN 689 Turbulence Modeling (Graduate Level, 12 students) Professor Sharath Girimaji
January 2022 - December 2022	Courses: Advisor:	OCEN 402 Naval Architecture (Senior Level, 55 students) OCEN 362 Hydrodynamics (Junior Level, 52 students) Assistant Professor Mirjam Fürth

May 2019 - August 2019	Position:	Teaching Assistant
	Location:	Pre-College Program, Stevens Institute of Technology
	Course:	Civil Engineering, Design, and Architecture A and B (AUTOCAD Program) (High-School Level, 35 students)
	Advisor:	Teaching Professor Leslie Brunell
May 2018 - September 2018	Position:	Teaching Assistant
	Location:	Egyptian Russian University, Egypt
	Courses:	AUTOCAD, and Mathematics II (Freshmen Level, ~45 students)
	Advisors:	Assistant Professor Ali Mahmoud Al-Sharawy Professor Abdel Baset Ismail
September 2017 - June 2018	Position:	Teaching Assistant
	Location:	Zewail City of Science and Technology , Egypt
	Courses:	CFD, Low-Speed Aerodynamics, Aircraft Conceptual Design, Introduction to Astronautics, Orbital and Space Flight Mechanics, Wind Energy: FAST Program, and Engineering Production. (Multi-Levels, ~20-30 students)
	Advisors:	Assistant Professor Ahmed Eltaweel Associate Professor Mostafa Abdallah

Contributions

- Delivered lectures, held office hours, and prepared projects, quizzes, and exams.
- Evaluated student deliverables and provided in-depth feedback.
- Used the web-based learning management system (Canvas) to organize course materials, announcements, and grades.

INDUSTRY EXPERIENCE

May 2022 - August 2022	Position:	Research & Development Engineering Intern
	Company:	Front Energies
	Location:	Houston, TX
	Contribution:	Integrated the mooring solver (MoorDyM) with OpenFOAM by building a new linking library in OpenFOAM Conducted validating simulations for the moored floater of a FOWT
July 2016 - October 2018	Position:	Research & Development Mechanical Engineer (SOLIDWORKS)
	Company:	Instant Green Energy
	Location:	Cairo, Egypt
	Contribution:	Worked in the field of energy-generating machines (magnetic motors)

SERVICE

September 2021 - June 2023	• Senator for Ocean Engineering Department at Graduate and Professional Students Governments at Texas A&M University.
March 2022 - August 2023	• Recruitment and outreach officer of the Aggie Pregnant and Parenting Student Organization at Texas A&M University.
July 2022, October 2022, June 2023 & June 2023	• Reviewer in - SNAME Maritime Convention (SMC) 2022, - 4th Novel Intelligent and Leading Emerging Sciences (NILES) conference 2022, - International Mechanical Engineering Congress & Exposition (IMECE) 2023, and - American Institute of Aeronautics and Astronautics (AIAA) SciTech conference 2024.

May 2021 - December 2022	<ul style="list-style-type: none"> • Presenter for Ocean Engineering Department, Texas A&M University - College Station at Graduate Engineering Student Advisory Council.
January 2022 & September 2022	<ul style="list-style-type: none"> • Moderating Session Chair at AIAA Science and Technology Forum and Exposition (AIAA SciTech) and SNAME Maritime Convention (SMC).
March 2022 - June 2022	<ul style="list-style-type: none"> • Tutor for a computational fluid dynamics course of 'Introduction to OpenFOAM' at Egypt Scholars.
Spring 2020	<ul style="list-style-type: none"> • Tutor for academic writing sessions about 'Latex' at Stevens Institute of Technology.
December 2018	<ul style="list-style-type: none"> • Academic Judge at The 7th Undergraduate Research Forum, Nile University.
July 2015	<ul style="list-style-type: none"> • Represented Space System Technology Lab. at the 3rd UNISEC GLOBAL Meeting, Japan.

SCHOLARSHIPS/AWARDS

Fall 2023 - Spring 2024	<ul style="list-style-type: none"> • America Bureau of Shipping Scholar, TAMU, America Bureau of Shipping Scholarship for academic and research excellence.
Spring 2023	<ul style="list-style-type: none"> • TAMU, Lawrence F. Guseman Award for outstanding contributions to the success and prosperity of the GPSG and the Graduate and Professional Student Body.
Fall 2022	<ul style="list-style-type: none"> • Fluids Engineering Division Summer Meeting - American Society of Mechanical Engineers, Who's Who Video Competition Award, 2nd place.
Summer 2022	<ul style="list-style-type: none"> • Society of Naval Architects and Marine Engineers, Graduate Student Paper & Poster Awards.
Summer 2022	<ul style="list-style-type: none"> • Fluids Engineering Division Summer Meeting - American Society of Mechanical Engineers, Karman Ghia Graduate Student Scholarship.
Spring 2022	<ul style="list-style-type: none"> • Office of Graduate and Professional Studies, TAMU, The Center for the Integration of Research, Teaching, and Learning (CIRTL) Associate Award. Course completed with distinction: An Introduction to Evidence-Based Undergraduate STEM Teaching.
Spring 2022	<ul style="list-style-type: none"> • Graduate and Professional Student Government, TAMU, Travel Award.
Spring 2022	<ul style="list-style-type: none"> • Student Research Week, TAMU, Texas Sea Grant Special Award for research excellence in Wave Energy Converters.
Fall 2021 - Spring 2022	<ul style="list-style-type: none"> • America Bureau of Shipping, TAMU, America Bureau of Shipping Scholarship for academic and research excellence.
2020, 2023	<ul style="list-style-type: none"> • Ocean Engineering Department, TAMU, Department Scholarship.

OTHER CERTIFICATES

2016	<ul style="list-style-type: none"> • Participation certificate from International Space Apps Challenge, Zewail City.
2015	<ul style="list-style-type: none"> • Participation certificate from Open Code for Sustainable Development Camp on the occasion of the Social Good Summit, AUC.
2015	<ul style="list-style-type: none"> • Participation and 3rd place certificates, at Scientific Poster Competition from 2nd Annual Undergraduate Scientific Conference, Zewail City.
2015	<ul style="list-style-type: none"> • Participation certificate and Innovation reward about attitude control during the acceleration phase, at Project Dragonfly Design Competition from The Initiative For Interstellar Studies, London.

COMMUNITY SERVICE

2020 - 2024	<ul style="list-style-type: none"> • Islamic Community of Bryan College Station (ICBCS), <i>Volunteer</i>.
2014 - 2015	<ul style="list-style-type: none"> • Rwaq, Arabic E-learning Website, <i>Ambassador</i>.
2013 - 2014	<ul style="list-style-type: none"> • IEEE-Cairo University Student Branch, <i>Non-technical Writer</i>.
2010 - 2011	<ul style="list-style-type: none"> • Resala and Life Makers charities, <i>Volunteer</i>.

JOURNAL PUBLICATIONS

1. Karim Ahmed, Ahmed A. Hamada, Ludovic Chatellier, Mirjam Fürth, 2024, ***A Modified Overset Method in OpenFOAM for Simultaneous Motion and Deformation: A Case Study of a Flexible Flapping Foil***, OpenFOAM® Journal, 4, 41–61.
2. Lubna Margha, Ahmed A. Hamada, Ahmed T Eltaweel, 2023, ***Dynamic Transition of Unsteady Supersonic Flow From Mach to Regular Reflection Over a Moving Wedge***, Journal of Fluids Engineering, ASME, 1-45.
3. Ahmed A. Hamada, Mirjam Fürth, 2023, ***Modelling and Analysis of the Leading-Edge Vortex on Flapping-Foil Turbines in Swing-Arm Mode***, Journal of Fluids Engineering, ASME, 1-14.
4. Yijun Sun, Ahmed A. Hamada, Omar Sallam, Björn Windén, Mirjam Fürth, 2023, ***The application of laminar numerical wave tank for a heaving buoy hydrodynamics study in low-turbulence nonlinear waves***, Journal of Engineering for the Maritime Environment, JEME-22-0117.
5. Ahmed A. Hamada, Abdelrahman A. Sultan, Mohamed M. Abdelrahman, Sept. 2018, ***Design, Build and Fly a Flying Wing***, Athens Journal of Technology and Engineering, Greece, vol. 3, No. 5.

Accepted:

6. Ahmed A. Hamada, Mirjam Fürth, Accepted, ***Numerical Simulation of the Effect of Buoy Geometries on PTO of Wave Energy Converters***, SNAME 2021 Transactions.

In-Review:

7. Ahmed A. Hamada, Lubna Margha, Mohamed M. AbdelRahman, Amr Guaily, In-review, ***Dynamic Shock Waves Control for an Unsteady Supersonic Flow with a Morphing Bump over a Flat Plate***, Shock Waves Journal.
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CONFERENCE PUBLICATIONS

1. Tarek Ayman, Mayar A. Elrefaie, Eman Sayed, Mohammed Elrefaie, Mahmoud Ayyad, Ahmed A. Hamada, Mohamed M. Abdelrahman, October 2023, ***Deep Learning-Based Prediction of Aerodynamic Performance for Airfoils in Transonic Regime***, 2023 5th Novel Intelligent and Leading Emerging Sciences Conference (NILES).
2. Ahmed A. Hamada, Lubna Margha, Ahmed K. Alnemr, Mohamed M. Abdelrahman, Amr Guaily, January 2023, ***Unsteady Supersonic Flow over a 2-D Morphing Shock Control Bump Using Different Velocity Profiles***, AIAA SciTech 2023 conference.
3. Lubna Margha, Ahmed A. Hamada, Ahmed Eltaweel, January 2023, ***RR to MR Over a Moving Wedge at A High Supersonic Flow***, AIAA SciTech 2023 conference.
4. Ahmed A. Hamada, Mirjam Fürth, August 2022, ***Development of a Finite Element Solver Including a Level-Set Method for Modeling Hydrokinetic Turbines***, American Society of Mechanical Engineers (ASME), Fluids Engineering Division Summer Meeting 2022 conference.
5. Ahmed A. Hamada, Lubna Margha, Mohamed M. AbdelRahman, Amr Guaily, August 2022, ***Shock System Dynamics of a Morphing Bump Over a Flat Plate***, American Society of Mechanical Engineers (ASME), Fluids Engineering Division Summer Meeting 2022 conference.
6. Lubna Margha, Ahmed A. Hamada, Ahmed Eltaweel, August 2022, ***Dynamic Transition From Mach to Regular Reflection Over a Moving Wedge***, American Society of Mechanical Engineers (ASME), Fluids Engineering Division Summer Meeting 2022 conference.
7. Lubna Margha, Ahmed A. Hamada, Othman Ahmed, Ahmed Eltaweel, August 2022, ***Numerical Investigation of a Rotating Double Compression Ramp Intake***, American Society of Mechanical Engineers (ASME), Fluids Engineering Division Summer Meeting 2022 conference.

8. Ahmed A. Hamada, Abigail Rolen, William McCullough, Mirjam Fürth, February 2022, ***Numerical Simulation of the effect of wave characteristics on PTO of Point Absorber Wave Energy Converter***, 27th SNAME Offshore Symposium, Texas Section of the Society of Naval Architects and Marine Engineers (SNAME).
9. Ahmed Aboelezz, Abdulrahman Yousef, Ahmed A. Hamada, and Mostafa Hassanalian, January 2022, ***Ducted Fan Experimental Investigation and Shape Optimization Using Computational Fluid Dynamics.***, American Institute of Aeronautics and Astronautics, AIAA SciTech 2022 Forum, CA.
10. Ahmed A. Hamada, Mirjam Fürth, October 2021, ***Numerical Simulation of the Effect of Buoy Geometries on PTO of Wave Energy Converters***, Society of Naval Architects and Marine Engineers (SNAME), SNAME Maritime Convention 2021, Providence RI.
11. Yusuf T. Elbadry, Ahmed A. Hamada, Mohammed A. Boraey, Mohamed M. AbdelRahman, September 2021, ***Lid-Driven Cavity Flow with Elliptic Obstacle at Different Orientations***, The 3rd Novel Intelligent and Leading Emerging Sciences Conference, Proceedings of Niles, IEEE Xplore.
12. Lubna Margha, Ahmed A. Hamada, Doyle D. Knight, Ahmed Eltaweel, November 2021, ***Dynamic Transition From Regular to Mach Reflection Over a Moving Wedge***, Proceedings of the ASME 2021 40th International, International Mechanical Engineering Congress and Exposition (IMECE2021), American Society of Mechanical Engineers.
13. Ahmed A. Hamada, Mirjam Fürth, June 2021, ***Ground Effect on Current Energy Harvesting from a Freely-Oscillating Circular Cylinder at Low Reynolds Number***, Proceedings of the ASME 2021 40th International, Conference on Ocean, Offshore and Arctic Engineering, American Society of Mechanical Engineers.
14. Ahmed A. Hamada, Omar Khaled Sallam, Colton R. Bonnaure, Patricia Itzel Rodriguez, Jack Stason, Mirjam Fürth, April 2021, ***Design of a Free Running High-Speed Craft Model for Testing off the Coast of Galveston***, Proceedings of the 26th Offshore Symposium, Texas Section of the Society of Naval Architects and Marine Engineers (SNAME).
15. Ahmed A. Hamada, Mahmoud M. Ayyad, Amr G. Guaily, January 2020, ***Variants of the Finite Element Method for the Parabolic Heat Equation: Comparative Numerical Study***, Recent Advances in Engineering Mathematics and Physics, Springer International Publishing.

ABSTRACT/PAPER PRESENTATIONS

1. Lubna Margha, Ahmed A. Hamada, Ahmed Eltaweel, November 2023, ***Dynamic Shock Waves transitions in Unsteady Supersonic Flows***, Bulletin of the American Physical Society, Washington DC.
2. Ahmed A. Hamada, Mirjam Fürth, September 2023, ***A Modified Overset Method in OpenFOAM for Simultaneous Motion and Deformation: A Case Study of a Flexible Flapping Foil Hydrokinetic Turbine***, Texas A&M Conference on Energy, Texas A&M Energy Research Society, TAMU, College Station, TX.
3. Ahmed A. Hamada, Lubna Margh, Sharath Girimaji, Mirjam Fürth, July 2023, ***Implementation of Partially Averaged Navier-Stokes Turbulent Closure Models in OpenFOAM***, 18th OpenFOAM Workshop, Genova, Italy.
4. Karim Ahmed, Ahmed A. Hamada, Ludovic Chatellier, Mirjam Fürth, July 2023, ***A Novel Overset Method in OpenFOAM for simultaneous motion and deformation***, 18th OpenFOAM Workshop, Genova, Italy.
5. Ahmed A. Hamada, Karim Ahmed, Ludovic Chatellier, Mirjam Fürth, April 2023, ***Overset in OpenFOAM: Improvements for Combined Motion And Deformation Simulations***, 22nd Computational Fluid Conference, Cannes, France.
6. Ahmed A. Hamada, Xinguo Wang, Mirjam Fürth, March 2023, ***High-fidelity CFD simulations of a high-speed craft for towing tank tests in calm water***, 28th SNAME Offshore Symposium, Texas Section of the Society of Naval Architects and Marine Engineers (SNAME), Houston, TX.

7. Ahmed A. Hamada, Mirjam Fürth, March 2023, *Improved Ocean Current Energy Harvesting through the Numerical Modeling of Flapping-Foil Hydrokinetic Turbines*, Texas A&M Student Research Week, TAMU, College Station, TX.
 8. Ahmed A. Hamada, Mirjam Fürth, September 2022, *Numerical investigation of the energy harvesting capabilities of NACA series flapping foil turbines in swing-arm mode*, Texas A&M Conference on Energy, Texas A&M Energy Research Society, TAMU, College Station, TX.
 9. Ahmed A. Hamada, Mirjam Fürth, March 2022, *Improved Ocean Wave Energy Harvesting through High Fidelity Numerical Modeling Coupled with Wave Tank Experiments*, Texas A&M Student Research Week, TAMU, College Station, TX.
 10. Ahmed A. Hamada, Mirjam Fürth, December 2021, *Review on Wave Energy Converters*, Ocean Engineering Department Meetings, TAMU, College Station, TX.
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PRE-PRINT PAPERS

1. Ahmed A. Hamada, Mirjam Fürth, Submitted, *Numerical investigation of the energy harvesting capabilities of NACA series flapping foil turbines in swing-arm mode*, Elsevier pre-print, Available at SSRN: <http://dx.doi.org/10.2139/ssrn.4153303>.
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TECHNICAL REPORTS

1. Ahmed A. Hamada, September 2022, *How to build a high-quality mesh using blockMesh in OpenFOAM*, Texas A&M University, Department of Ocean Engineering, CFD community, Report No.: OCEN CFD Technical Report #220004.
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