

FLAVIO A. C. MARTINS

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[Google Scholar](#) | [GitHub](#) | [LinkedIn](#)

RESEARCH INTERESTS

I study unsteady flows and fluid-structure interaction through numerical methods and experimental measurements. My background spans vortex-induced vibration, marine propulsion, towing-tank experiments and coherent structures in particle-tracking data. I develop hybrid CFD methods and scientific software, with an interest in improving the connection between hydrodynamic models and validation experiments.

EDUCATION

TU Delft (Delft, The Netherlands) *Mar. 2023 – Present*
PhD in Aerospace Engineering (in progress)

- **Thesis:** *3D Unsteady CFD Model for Multi-Rotor Body Fluid-Structure Interaction*
Promotor: Prof. Dr. ir. Carlos Simão Ferreira; Supervisor: Dr. Alexander van Zuijlen

Queen's University (Kingston, ON, Canada) *Mar. 2019 – Feb. 2021*
MAsc in Mechanical & Materials Engineering GPA: 4.2/4.3

- **Thesis:** *Detecting Lagrangian Coherent Structures in Realistic Experimental Fluid-Flow Data Sets*
Supervisor: Dr. David E. Rival.

Federal University of ABC (Santo André, SP, Brazil) *Oct. 2016 – Sept. 2018*
Bachelor in Aerospace Engineering (Honours / Valedictorian) GPA: 3.7/4.0

- **Thesis:** *Vibration Analysis and FSI Effects of Two-Dimensional, Aeroelastic Aeronautical Structures*
Supervisor: Dr. Marcelo S. Araujo

Federal University of ABC (Santo André, SP, Brazil) *Sept. 2012 – Sept. 2016*
Bachelor in Science & Technology (Honours) GPA: 3.6/4.0

PROFESSIONAL EXPERIENCE

RivalLab | Partnership with Pratt & Whitney (Kingston, ON, Canada) *May 2021 – Mar. 2022*
Research Engineer [RivalLab](#)

- Calibrated a transitional RANS turbulence model ($k-\omega-\gamma$) against experimental data to improve aircraft-turbine simulations for Pratt & Whitney Canada.
- Designed and built towing-tank experimental setups for aerodynamic surface analysis, integrating actuation and measurement systems for controlled unsteady-flow testing.
- Acquired and post-processed PIV and PTV data to characterise unsteady surface-flow fields.

Civil Struct. Eng. LTD (São Paulo, Brazil) *Jul. 2017 – Jan. 2018*
Mechanical Engineering Intern Manager: [Dr. Marcelo Araujo](#)

- Contributed to multiple stages of civil engineering projects, from client site visits and load estimation to structural modelling and technical reporting.
- Developed a real-time data-acquisition and spectral-analysis system for vibration measurements in machine foundations, including sensor integration and a custom monitoring interface.

OPEN-SOURCE SOFTWARE

OpenONDA — Hybrid CFD framework

github.com/EngFlavioMartins/OpenONDA

- Designed and built a modular CFD framework, in Python and C++, that unifies a GPU-accelerated Vortex Particle Method (Lagrangian) with a Finite Volume Method (Eulerian) and an OpenFOAM interface under a single, extensible architecture.

JOURNAL ARTICLES (INCLUDING ACCEPTED WORK)

1. Martins, F. A. C. (2026). OpenONDA: A Python Interface for In-Line Control of OpenFOAM Solvers. *OpenFOAM Journal* (accepted for publication).
2. Martins, F. A. C., van Zuijlen, A., & Ferreira, C. S. (2025). Proof of Concept for Multirotor Systems with Vortex-Generating Modes for Regenerative Wind Energy: A Study Based on Numerical Simulations and Experimental Data. *Wind Energy Science*, 10, 41–58.
3. Martins, F. A. C., Sciacchitano, A., & Rival, D. E. (2021). Detection of Vortical Structures in Sparse Lagrangian Data Using Coherent-Structure Colouring. *Experiments in Fluids*, 62(4), 69.
4. Martins, F. A. C., Avila, J. P. J., & Silva, M. A. D. (2019). A Linear Approach for Sizing Optimization of Isostatic Trussed Structures Subjected to External and Self-Weight Loads. *International Journal of Steel Structures*, 19(4), 1146–1157.
5. Martins, F. A. C., & Avila, J. P. J. (2019). Effects of the Reynolds Number and Structural Damping on Vortex-Induced Vibrations of an Elastically-Mounted Rigid Cylinder. *International Journal of Mechanical Sciences*, 156, 235–249.
6. Martins, F. A. C., & Avila, J. P. J. (2019). Three-Dimensional CFD Analysis of Damping Effects on Vortex-Induced Vibrations of 2DOF Elastically-Mounted Circular Cylinders. *Marine Structures*, 65, 12–31.
7. Martins, F. A. C., & Zanotello, M. (2018). Mecânica Celeste e a Teoria dos Sistemas Dinâmicos: Uma Revisão do Problema Circular Restrito de Três Corpos. *Revista Brasileira de Ensino de Física*, 40(2), e2310.

PREPRINTS

1. Martins, F. A. C., van Zuijlen, A., & Ferreira, C. J. S. (2026). Toward Meshless Turbulent Flow Simulation: LES-Integrated Vortex Particle Method. *arXiv preprint* arXiv:2601.06942.
2. Martins, F. A. C., & Rival, D. E. (2021). A Voronoi-Tessellation-Based Approach for Detection of Coherent Structures in Sparsely-Seeded Flows. *arXiv preprint* arXiv:2103.09884.

CONFERENCE PROCEEDINGS

1. Martins, F. A. C., van Zuijlen, A., & von Terzi, D. A. (2026). Toward a 3D Hybrid Vortex Particle-Grid Approach for External Flows. *Journal of Physics: Conference Series*, 3224(4), 042069.
2. Martins, F. A. C., Ferreira, C. S., & van Zuijlen, A. (2024). Numerical Investigation of Atmospheric Boundary Layer Control in Wind Farms with Multirotor Systems. *Journal of Physics: Conference Series*, 2767(7), 072006.
3. Ferreira, C., Bensason, D., Broertjes, T. J., Sciacchitano, A., Martins, F. A. C., & Ajay, A. G. (2024). Enhancing Wind Farm Efficiency Through Active Control of the Atmospheric Boundary Layer's Vertical Entrainment of Momentum. *Journal of Physics: Conference Series*, 2767(9), 092107.
4. Martins, Flavio A. C., Alcântara, Antonio, and Rival, David. "State-Observer-Based Data Assimilation for Real Flow Analysis: Integrating Computation and Measurement." *NATO Unclassified*, May 2022. (Kingston, ON, Canada)

5. Martins, Flavio A. C., and Avila, Juan. “Three-Dimensional CFD Analysis of Damping Effects on Vortex-Induced Vibrations of 2DOF Cylinders.” *SIIC-USP*, September 2018. ([Online version](#), ID: 1873) (São Paulo, SP, Brazil)
6. Martins, Flavio A. C., Silva, Marcelo, and Brasil, Reyolando. “Detection of Damage in Aerospace Structures Using Optimization Techniques on Impact Tests Results.” *Proceeding Series of the Brazilian Society of Computational and Applied Mathematics (CNMAC)*, 2018. (São Paulo, SP, Brazil)
7. Martins, Flavio A. C., Silva, Marcelo, and Brasil, Reyolando. “Topology Optimization of 2D Trussed Structures.” *CILAMCE*, November 2017. (São José dos Campos, SP, Brazil)
8. Martins, Flavio A. C., and Silva, Marcelo. “Analysis of the Dynamic Response of the Internal Structure of the ONERA M6 Wing.” *IX Workshop in Dynamic Systems*, September 2017. (São Paulo, SP, Brazil)
9. Martins, Flavio A. C., and Silva, Marcelo. “Identification of Damage in Aerospace Structures Using Optimization Techniques and Impact Tests.” *ASCE’s EMI*, March 2017. (Rio de Janeiro, RJ, Brazil)

TECHNICAL AND ACADEMIC REPORTS

1. Martins, Flavio A. C., et al. “Calibration of Menter’s RANS γ -Model for Transonic, Transitional Flows,” 2022 (NDA-protected).
2. Martins, Flavio A. C., and Silva, Marcelo. “Optimization of the Internal Structure of Statically and Dynamically Loaded Wings,” 2018 (CNPq-funded). ([Read online](#)).
3. Martins, Flavio A. C., and Zanutello, Marcelo. “Applications of Dynamical Systems Theory to Biological and Chemical Problems,” 2017 (CNPq-funded). ([Read online](#)).
4. Martins, Flavio A. C., and Zanutello, Marcelo. “Celestial Mechanics and the Theory of Dynamic Systems: A Revision of the Circular Restricted Three-Body Problem,” 2016 (CNPq-funded). ([Read online](#)).

RESEARCH EXPERIENCE

TU Delft Wind Energy Institute (Delft, The Netherlands)

Mar. 2023 – Present

PhD Candidate

Supervisors: Prof. Dr. ir. C. Simão Ferreira & Dr. A. van Zuijlen

- Developed a 3D hybrid CFD model for multi-rotor fluid-structure interaction, resolving wake-structure coupling in multi-rotor wind-energy systems.
- Investigated vortex-generating multirotor configurations for regenerative wind energy and their effect on atmospheric boundary layer entrainment in wind farms.
- Wrote a GPU-based particle solver with an integrated LES methodology for meshless, turbulent-flow simulation of external flows.

Queen’s University (Kingston, ON, Canada)

Mar. 2019 – Mar. 2022

MASc Student / Research Engineer

Supervisor: [Dr. David E. Rival](#)

- Developed a graph-theory-based technique for detecting coherent motion in tracer data.
- Designed and benchmarked a hybrid propulsion / energy-harvesting system for marine applications using CFD.
- Ran towing-tank experiments on unsteady airfoil and delta-wing flows, collecting and analysing PIV, PTV, and force data at high Reynolds numbers.

UFABC's Fluid-Structure Interaction Lab (Santo André, SP, Brazil)

Research Associate

Feb. 2018 – Feb. 2019

Supervisor: [Dr. Juan Avila](#)

- Conducted 2D and 3D CFD studies of vortex-induced vibration (VIV) in elastically mounted cylinders, with relevance to offshore riser dynamics.
- Investigated the influence of mechanical parameters and damping on cylinder vibration response.

UFABC (Santo André, SP, Brazil)

Undergraduate Research Fellow

Oct. 2016 – Sept. 2018

Supervisor: [Dr. Marcelo S. Araujo](#)

- Optimised the internal structure of statically and dynamically loaded wings (CNPq-funded).

UFABC (Santo André, SP, Brazil)

Undergraduate Research Fellow

Sept. 2015 – Sept. 2017

Supervisor: [Prof. Dr. Marcelo Zanotello](#)

- Studied celestial mechanics through the circular restricted three-body problem (CNPq-funded).
- Applied dynamical-systems theory to biological and chemical problems (CNPq-funded).

TEACHING**TU Delft (Delft, The Netherlands)**Project Supervisor — *Test, Analysis and Simulation*

2025 – 2026

- Used student-led explanations and technical questioning to assess understanding of project methods, assumptions and results.

TU Delft (Delft, The Netherlands)

MSc Thesis Co-Supervisor

2026

- Co-supervised, with Dr. Alexander van Zuijlen, an MSc thesis on a GPU-accelerated Cartesian Fast Multipole Method for particle-based flow simulation. ([Read online](#)).

Queen's University (Kingston, ON, Canada)

Teaching Assistant — Experimental Fluid Dynamics

Mar. 2019 – Feb. 2021

- Taught undergraduate laboratory sessions and supported courses on experimental fluid dynamics.

Presentations and Lectures

1. Martins, Flavio. "Implementation of Finite-Element Codes in MATLAB." VII Workshop in Mechanical Engineering (WEM), October 2018 (São Paulo, SP, Brazil).
2. Martins, Flavio. "Introduction to Structural Analysis Using the Finite-Element Software Abaqus." VI–VII Workshop in Mechanical Engineering (WEM), October 2017 & 2018 (São Paulo, SP, Brazil).

HONOURS AND AWARDS

- *Institute of Engineering Award*, 2018, for ranking among the top three graduates of UFABC's Aerospace Engineering programme.
- Second-highest GPA in the history of UFABC's Aerospace Engineering programme, as of 2018.

ACADEMIC LEADERSHIP AND SERVICE

Alongside research, I contribute to faculty life through recurring event organisation, support for incoming PhD candidates and volunteer teaching.

1. **Chair, Aerospace Engineering PhD Council**, TU Delft (member 2023–2024; Chair 2025–2026). Redesigned the annual PhD Symposium as a talk-show-format event with expert panels (nearly 200 attendees) while cutting its budget by roughly 75% (EUR 20k to 5k). Secured industry funding for internal events and introduced council-rotation rules and PhD office hours.

2. **Member, TU Delft University PhD Council**, 2026. Designed and delivered university-wide events connecting PhD candidates across faculties, managing budgets, schedules, stakeholder coordination and fundraising.
3. **TU Delft Representative, Dutch OpenFOAM User Community**, 2023–2026. Co-organised the national user meetings, curating tutorial content and recruiting speakers.
4. **Student Journalist, DUWIND**, WindEurope Annual Event 2025 (Copenhagen). Produced a specialist interview series (30+ contacts, 12 interviews, 4 reports reaching hundreds) and joined a panel discussion with a policymaker on engineering education and a unified European engineering CV.
5. **Q&A Volunteer, TU Delft Start-up Module A**, 2023. Welcomed and supported incoming PhD candidates across 9 editions of the course, addressing onboarding questions.

OUTREACH AND PUBLIC ENGAGEMENT

1. **Volunteer Instructor (2023) and Team Leader (2024–2026), OffshoreWind4Kids**. Taught children and parents the principles of wind energy at beach demonstrations, building and operating model turbines. ([Read online](#)).
2. **Educational Materials Developer, “Wind for Kids” project**, 2024–2025. Developed booklets, games and classroom activities to help primary-school teachers introduce energy and wind concepts; coordinated graphic design and refined the materials through trials with schoolchildren.
3. **Faculty Open Day Volunteer**, TU Delft (2023–2025). Represented the Wind Energy section at the faculty booth, engaging prospective students and their families.
4. **Instructor Volunteer, 015 Duurzaam programme**, Delft public library (2023). Taught engineering concepts such as water management and wind energy to children.
5. **Volunteer Lecturer**, UFABC’s VII Workshop on Mechanical and Marine Engineering (2018). Delivered mini-courses introducing finite-element structural analysis to undergraduate students.

MEDIA AND PUBLIC VISIBILITY

- Panelist at three TU Delft events: the ‘Safety Beyond Boundaries’ D&I panel on aerospace and LGBTIQ+ safety (2024); the AE D&I Week panel representing visible minorities (2024); and “TU Delft for Life,” on the PhD as a career path after the Bachelor’s. ([Read online](#)).
- Interview featured in TU Delft’s Faculty of Aerospace Engineering News on the Triangle Tuning programme, 2024. ([Read online](#)).
- Academic profile and achievements featured in the *Institute of Engineering* yearly magazine, 2019.

LANGUAGES

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| • Portuguese — Native | • English — Fluent (C2) | • Dutch — Intermediate (B1) |
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