

Flavio A. C. Martins

CFD & Simulation Engineer

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Profile

Mechanical and aerospace engineer combining CFD, finite-element methods, fluid-structure interaction and experimental validation. Develops Python/C++ simulation tools and has worked on industrial model calibration, vibration analysis and instrumented experiments. Currently a TU Delft PhD candidate, interested in applied multiphysics problems and reusable modelling workflows.

Technical Skills

Flow modelling: OpenFOAM; computational fluid dynamics (CFD); LES and RANS; vortex-particle and finite-volume methods; fluid-structure interaction.

Scientific software: Python, C++, CUDA, MATLAB; Git and Linux; modular numerical solvers and Python/C++ interfaces.

Experiments and validation: PIV/PTV and force measurements; towing-tank rigs; instrumentation; model calibration, data assimilation and signal processing.

Mechanical analysis: Abaqus; finite-element methods (FEM); structural dynamics, vibration analysis and optimisation; MATLAB-based calculations.

Experience

PhD Candidate - Computational Aerodynamics

TU Delft Wind Energy Institute | Delft, Netherlands | Mar 2023 - Present

- Developed hybrid Eulerian-Lagrangian CFD methods for unsteady external flows and integrated large-eddy simulation into a GPU-based particle solver.
- Developed OpenONDA, an open-source Python/C++ framework coupling a GPU-accelerated vortex-particle solver with OpenFOAM through an in-line Python interface.
- Investigated multirotor wake configurations and atmospheric-boundary-layer entrainment using numerical simulations and experimental data; published in Wind Energy Science (2025).

Research Engineer

RivalLab, Queen's University | Kingston, Canada | May 2021 - Mar 2022

- Calibrated a transition-sensitive RANS model against experimental data for transonic turbine flows in a Pratt & Whitney Canada research partnership; contributed an NDA-protected technical report.
- Designed and built towing-tank setups with actuation and measurement systems; acquired and analysed PIV/PTV data for unsteady flows.

Graduate Researcher - Fluid Dynamics

Queen's University | Kingston, Canada | Mar 2019 - Feb 2021

- Developed graph-based methods for detecting coherent structures in sparse particle-tracking data; published in Experiments in Fluids (2021).
- Used CFD to assess a marine propulsion and energy-harvesting concept; ran towing-tank tests with PIV/PTV and force measurements.

Earlier Engineering Experience

Research Associate - Fluid-Structure Interaction

Federal University of ABC (UFABC) | Santo André, Brazil | Feb 2018 - Feb 2019

- Investigated vortex-induced vibration and damping in 2D/3D CFD studies of elastically mounted cylinders relevant to offshore riser dynamics; published in Marine Structures and International Journal of Mechanical Sciences.

Mechanical Engineering Intern

Civil Structural Engineering Ltd | São Paulo, Brazil | Jul 2017 - Jan 2018

- Developed a real-time vibration-monitoring system integrating sensors, spectral analysis and a monitoring interface; supported load estimation, structural modelling and technical reporting.

Education

PhD in Aerospace Engineering - in progress

Delft University of Technology, Netherlands | 2023 - Present

MASc in Mechanical & Materials Engineering

Queen's University, Canada | GPA 4.2/4.3 | 2019 - 2021

BSc in Aerospace Engineering - Honours / Valedictorian

Federal University of ABC, Brazil | 2016 - 2018

BSc in Science & Technology - Honours

Federal University of ABC, Brazil | 2012 - 2016

Leadership, Teaching & Volunteering

- Chair, TU Delft Aerospace Engineering PhD Council (2025-2026; member since 2023): organised a symposium for nearly 200 attendees, reducing its budget from EUR 20,000 to EUR 5,000; secured industry sponsorship.
- Community and faculty service: co-organised Dutch OpenFOAM meetings (2023-2026); supported incoming PhD candidates across nine Start-up Module editions (2023) and volunteered at faculty open days (2023-2025).
- Volunteer teaching: OffshoreWind4Kids instructor (2023) and team leader (2024-2026), leading beach demonstrations for children and parents; taught water and wind-energy concepts at Delft public library (2023).
- Teaching and materials: fluid-dynamics labs, MATLAB/Abaqus workshops and student supervision; developed Wind for Kids booklets, games and activities (2024-2025), coordinating graphic design and trials with children.

Selected Research & Software

OpenONDA. Python interface for in-line OpenFOAM solver control. OpenFOAM Journal, accepted for publication (2026).

Multirotor wind-energy systems. Wind Energy Science 10, 41-58 (2025). Numerical simulations and experimental data.

Vortex-induced vibration and damping. Marine Structures 65, 12-31 (2019); International Journal of Mechanical Sciences 156, 235-249 (2019).

Languages

Portuguese: native | English: C2 | Dutch: B1