Simão **Rodrigues**

PhD, Aerospace Engineering

Toulouse, France · www.simaor.net · simaorodrigues · simaosr

Summary

- Experienced in **aeroacoustic optimization** of **wind turbines**, in the development of **sensitivity analysis** tools for **turbomachinery** applications and in developing tools for sustainable design using Life Cycle Assesment.
- Particularly interested in the development of **numerical methods**, **numerical aerodynamic analysis** and **optimization** with focus on sustainability concerns.
- Comfortable programming in **Python**, **Fortran**, C/C++, with experience in developing **parallel processing** capable software.

Professional Experience

Optimization Engineer @ Capgemini Engineering

Oct 2022 – Present · Capgemini Engineering, Toulouse, France

- Development of **sustainable optimization** tools integrating Life Cycle Assessment.
- Visualization and exploration of **multi-objective optimization** results.
- Aerodynamic shape optimization of propeller blades.
- Coordination and development of Overall Aircraft Design tools in **SoSTrades**.
- Contribution to the WITNESS integrated assessment model.
- Development of models for analysis and optimization of multi-energy systems.

Postdoctoral Researcher @ ISAE-SUPAERO

Apr 2021 – Sep 2022 · ISAE-SUPAERO, Toulouse, France

- Developed aerodynamic shape optimization tools for aircraft intake design.
- Conducted shape parameterization, flow analysis, and data visualization.
- Co-advised student projects.

Postdoctoral Researcher (Project FLEXCRAFT)

Apr 2019 – Feb 2020 · Instituto Superior Técnico, Lisboa

- Developed an RPV as a demonstrator for a modular hybrid-electric aircraft concept.
- Designed, simulated, and constructed aircraft components.
- Led experimental testing and team coordination.

Education

PhD in Aerospace Engineering

2013 – 2019 · Instituto Superior Técnico, Lisboa

- **Thesis:** Aero-thermal Analysis and Design of Turbomachinery Blades using Multi-stage Adjoint Methods
- Sensitivity Analysis · Automatic Differentiation · CFD · MPI

MSc in Aerospace Engineering

2006 – 2012 · Instituto Superior Técnico, Lisboa

- **Thesis:** Aeroacoustic Optimization of Wind Turbine Blades
- Developed a fast wind turbine aeroacoustic prediction and optimization tool.
- Genetic Algorithms · Shape Parameterization · Noise Reduction

Skills / Tools

Programming Languages

Python · Fortran · C/C++ · Java · ...

Software

Pandas · Plotly/Dash · Brigthway2 · GEMSEO · SoSTrades · Solidworks · Ansys APDL · SU2 · StarCCM+ · Tecplot · Paraview · Pointwise · Git

Personal

Adaptable · Team Player · Creative · Problem-solving

Interests

Multidisciplinary Optimization · Sustainability · Life Cycle Assessment · Data Analysis · Numerical Modeling · Data Visualization · CFD · Aeroacoustics · Wind Turbines · Aircraft Design

Languages

Portuguese ●●●●●
English ●●●●○
French ●●●○○
Spanish ●●●○○
German ●○○○○

Publications

Journal Articles

- Afonso, F., M. Sohst, C. M. Diogo, **S. S. Rodrigues**, A. Ferreira, I. Ribeiro, R. Marques, F. F. Rego, A. Sohouli, J. Portugal-Pereira, H. Policarpo, B. Soares, B. Ferreira, E. C. Fernandes, F. Lau, and A. Suleman (2023). "Strategies towards a more sustainable aviation: A systematic review". In: *Progress in Aerospace Sciences* 137, p. 100878. ISSN: 0376-0421. DOI: https://doi.org/10.1016/j.paerosci.2022.100878.
- Gibert Martínez, I., F. Afonso, **S. S. Rodrigues**, and F. Lau (2021). "A Sequential Approach for Aerodynamic Shape Optimization with Topology Optimization of Airfoils". In: *Mathematical and Computational Applications* 26.2. ISSN: 2297-8747. DOI: 10.3390/mca26020034.
- **S. S. Rodrigues** and A. C. Marta (2020). "Adjoint-based shape sensitivity of multi-row turbomachinery". In: *Structural and Multidisciplinary Optimization* 61, pp. 837–853. DOI: 10/df35.
- **S. S. Rodrigues** and A. C. Marta (2019). "On Addressing Wind Turbine Noise with After-Market Shape Blade Add-Ons". In: *Renewable Energy* 140, pp. 602–614. ISSN: 0960-1481. DOI: 10/gfw8m2.
- **S. S. Rodrigues** and A. C. Marta (2018). "Adjoint Formulation of a Steady Multistage Turbomachinery Interface Using Automatic Differentiation". In: *Computers & Fluids* 176, pp. 182–192. ISSN: 0045-7930. DOI: 10/gfst5s.
- **S. S. Rodrigues** and A. C. Marta (2014). "On Addressing Noise Constraints in the Design of Wind Turbine Blades". In: *Structural and Multidisciplinary Optimization* 50.3, pp. 489–503. ISSN: 1615-1488. DOI: 10/f6dhxr.

Conference Proceedings

- Oliveira, É., F. Afonso, H. Policarpo, **S. S. Rodrigues**, J. Lourenço, J. Ornelas, P. Pinto, R. da Silva, N. M.M., N. Maia, F. Lau, and A. Suleman (2019). "Ground Vibration Test of a Modular Remotely Piloted Vehicle". In: *ICEDyn 2019 - International Conference on Structural Engineering Dynamics*. Viana do Castelo, Portugal.
- **S. S. Rodrigues** and A. C. Marta (2018). "On the Treatment of Multirow Interface in Aerodynamic Turbomachinery Adjoint Solvers". In: *Proceedings of the 6th International Conference on Engineering Optimization*. Springer, Cham. Lisbon,Portugal, pp. 879–887.
- **S. S. Rodrigues** and A. C. Marta (2015). "Discrete Adjoint Mixing-Plane Formulation for Multi-Stage Turbomachinery Design". In: *Congresso de Métodos Numéricos em Engenharia 2015*. Lisbon,Portugal.
- **S. S. Rodrigues** and A. C. Marta (2014). "Design of After-Market Wind Turbine Blade Add-Ons for Noise Reduction". In: *Proceedings of the 4th International Conference on Engineering Optimization*. Lisbon,Portugal: CRC Press, p. 245.
- **S. S. Rodrigues** and A. C. Marta (2014). "Framework for Low-Noise Wind Turbine Blade Design". In: *Proceedings of the ICAS 2014 - 29th Congress of the International Council of the Aeronautical Sciences*. St. Petersburg ,Russia.

A publication list is also available from Orcid: (0000-0002-2678-9797)

Scholarships

Post-Doc Fellowship

Portugal 2020 Framework Program

2019 – 2020

- Flexcraft Project (www.flexcraft.pt)
- Supervisor: Prof. Fernando Lau

PhD Scholarship

Fundação para a Ciência de Tecnologia (FCT)

2014 – 2018

- Supervisor: Prof. André C. Marta
- Scholarship ID: SFRH/BD/97521/2013

Research Fellowship

Instituto de Engenharia Mecânica (IDMEC)

2013 – 2014

- Supervisor: Prof. André C. Marta
- Project ID: General Electric PE-416

Personal Projects

Portal Tolkienianos

www.tolkienianos.pt

Setup and maintained a Tolkien fan website with a discussion forum, image gallery and encyclopedia, using both open-source and custom developed software.

Sinalizar Lagos

Implemented a website for tracking and reporting issues in my hometown using the open-source code *fixmystreet*.