



Pier Francesco Melani

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Skype: melanifrancesco **LinkedIn:** www.linkedin.com/in/pierfrancescomelani

Date of birth: 20/02/1994 **Nationality:** Italian

EDUCATION AND TRAINING

[01/11/2018 – 31/01/2022] **Doctor of Philosophy in “Energy Engineering and Innovative Industrial Technologies”**

Department of Industrial Engineering (DIEF), Università degli Studi di Firenze

Address: Via di Santa Marta 3, 50139, Firenze, Italy

Main subject / occupational skills covered:

- Computational Fluid Dynamics (CFD)
- Unsteady aerodynamics
- Modelling and numerical simulation of wind turbines
- Design and optimisation of Darrieus vertical axis wind turbines

[09/10/2015 – 24/07/2018] **Master Degree in Mechanical Engineering (Internal Combustion Engines and Turbomachinery) - 110/110**

Politecnico di Milano

Address: Piazza Leonardo da Vinci 32, 20133, Milano, Italy

[03/04/2016 – 12/08/2016] **Erasmus Plus**

Technische Universität München

Address: Arcisstraße 21, 80333, Munich, Germany

[09/09/2007 – 04/07/2012] **Classical High School Diploma - 100/100**

Liceo Classico Statale Michelangiolo

Address: Via della Colonna 9, 50121, Firenze, Italy

[09/10/2012 – 23/09/2015] **Bachelor Degree in Mechanical Engineering - 108/110**

Politecnico di Milano

Address: Piazza Leonardo da Vinci 32, 20133, Milano, Italy

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING C1 **READING** C2 **WRITING** C2

SPOKEN PRODUCTION C1 **SPOKEN INTERACTION** C1

German

LISTENING C1 **READING** C1 **WRITING** C1

SPOKEN PRODUCTION B2 **SPOKEN INTERACTION** B2

Japanese

LISTENING A1 **READING** A1 **WRITING** A1

SPOKEN PRODUCTION A1 **SPOKEN INTERACTION** A1

DRIVING LICENCE

Motorbikes: A

Cars: B

DIGITAL SKILLS

My Digital Skills

Microsoft Office (Word Excel PowerPoint)

Operating systems

Microsoft Windows | Linux Ubuntu | Mac OS X

Programming languages

C | Python | LaTeX | C++ | MatlabOctave | Html5

CAD software

SolidWorks | Inventor | Caeses

Numerical simulation

Abaqus | OpenFOAM | ANSYS Fluent | XFoil | WindPro

Image processing

GIMP | InkScape | Blender - basics

OTHER SKILLS

Other skills

- First aid: certified in providing first aid, as part of my volunteering activity at Misericordia of Florence
- Sports: SCUBA Diving (PADI Open Water license), Shaolin Gong Fu and Taijiquan (first level certificate at Shaolin Quan Fa Milan)
- Hobbies: motorbike, Chan meditation, Chinese and Japanese cultural studies, gardening

CONFERENCES AND SEMINARS

- [10/09/2019 – 12/09/2019] **ATI Conference 2019** Modena
- [20/06/2020 – 24/06/2020] **ASME TurboExpo 2020** online
- [27/09/2020 – 01/10/2020] **TORQUE Conference 2020** online
- [24/05/2021 – 27/05/2021] **WESC Conference 2021** online
- [06/06/2021 – 10/06/2021] **ASME TurboExpo 2021** online
- [14/09/2021 – 16/09/2021] **ATI Conference 2021** online

PUBLICATIONS

- [2019] **Experimental Assessment of an Actuator-Line Simulation Tool for VAWTs**
https://doi.org/10.1007/978-3-030-13531-7_11
Melani, P. F., Schito, P., and Persico, G., 2018, "Experimental Assessment of an ACL Simulation Tool for VAWTs," *Proc. of the TURBWind 2018 Colloquium*, Riva del Garda (Italy), September 6-7.
- [2019]
An annotated database of low Reynolds aerodynamic coefficients for the NACA0021 airfoil
<https://doi.org/10.1063/1.5138844>
Melani, P.F., Balduzzi, F., Ferrara, G., and Bianchini, A., 2019, "An annotated database of low Reynolds aerodynamic coefficients for the NACA0021 airfoil", AIP Conference Proceedings 2191, 020111
- [2019]
An annotated database of low Reynolds aerodynamic coefficients for the NACA0018 airfoil
<https://doi.org/10.1063/1.5138843>
Melani, P.F., Balduzzi, F., Ferrara, G., and Bianchini, A., 2019, "An annotated database of low Reynolds aerodynamic coefficients for the NACA0018 airfoil", AIP Conference Proceedings 2191, 020110
- [2020]
Influence of key design parameters on the aerodynamic performance of a centrifugal compressor volute for turbocharger applications
<https://doi.org/10.1115/GT2020-15195>
Melani, PF, Balduzzi, F, Bianchini, A, Ferrara, G, Hoffer, P, Montesino, S, & Brenner, M. "Influence of Key Design Parameters on the Aerodynamic Performance of a Centrifugal Compressor Volute for Turbocharger Applications." Proceedings of the ASME Turbo Expo 2020: Turbomachinery Technical Conference and Exposition. Volume 8: Industrial and Cogeneration; Manufacturing Materials and Metallurgy; Marine; Microturbines,

Turbochargers, and Small Turbomachines. Virtual, Online. September 21–25, 2020. V008T20A018. ASME.

[2020]

Combined numerical and experimental study on the use of gurney flaps for the performance enhancement of NACA0021 airfoil in static and dynamic conditions

<https://doi.org/10.1115/GT2020-15196>

Balduzzi, F, Holst, D, Melani, PF, Wegner, F, Nayeri, CN, Ferrara, G, Paschereit, CO, & Bianchini, A. "Combined Numerical and Experimental Study on the Use of Gurney Flaps for the Performance Enhancement of NACA0021 Airfoil in Static and Dynamic Conditions." Proceedings of the ASME Turbo Expo 2020: Turbomachinery Technical Conference and Exposition. Volume 12: Wind Energy. Virtual, Online. September 21–25, 2020. V012T42A006. ASME.

[2020]

An experimental and numerical analysis of the dynamic variation of the angle of attack in a vertical-axis wind turbine

<https://doi.org/10.1088/1742-6596/1618/5/052064>

Melani, P. F., Balduzzi, F., Brandetti, L., Ferreira, C. S., and Bianchini, A., 2020, "An Experimental and Numerical Analysis of the Dynamic Variation of the Angle of Attack in a Vertical-Axis Wind Turbine," J. Phys.: Conf. Ser., 1618, p. 052064.

[2020]

How to extract the angle attack on airfoils in cycloidal motion from a flow field solved with computational fluid dynamics? Development and verification of a robust computational procedure

<https://doi.org/10.1016/j.enconman.2020.113284>

Melani, P.F., Balduzzi, F., Ferrara, G., Bianchini, A., "How to extract the angle attack on airfoils in cycloidal motion from a flow field solved with computational fluid dynamics? Development and verification of a robust computational procedure", Energy Conversion and Management, Volume 223, 2020, 113284

[2021]

A Robust Procedure to Implement Dynamic Stall Models Into Actuator Line Methods for the Simulation of Vertical-Axis Wind Turbines

<https://doi.org/10.1115/GT2021-59102>

Melani, PF, Balduzzi, F, & Bianchini, A. "A Robust Procedure to Implement Dynamic Stall Models Into Actuator Line Methods for the Simulation of Vertical-Axis Wind Turbines." Proceedings of the ASME Turbo Expo 2021: Turbomachinery Technical Conference and Exposition. Volume 1: Aircraft Engine; Fans and Blowers; Marine; Wind Energy; Scholar Lecture. Virtual, Online. June 7–11, 2021. V001T40A001. ASME.

[2021]

Combined Numerical and Experimental Study on the Use of Gurney Flaps for the Performance Enhancement of NACA0021 Airfoil in Static and Dynamic Conditions

<https://doi.org/10.1115/1.4048908>

Balduzzi, F., Holst, D., Melani, P. F., Wegner, F., Nayeri, C. N., Ferrara, G., Paschereit, C. O., and Bianchini, A. (January 13, 2021). "Combined Numerical and Experimental Study on the Use of Gurney Flaps for the Performance Enhancement of NACA0021 Airfoil in Static and Dynamic Conditions." ASME. J. Eng. Gas Turbines Power. February 2021; 143(2): 021004.

[2021]

Tailoring the actuator line theory to the simulation of Vertical-Axis Wind Turbines

<https://doi.org/10.1016/j.enconman.2021.114422>.

Melani, P.F., Balduzzi, F., Ferrara, G., Bianchini, A., "Tailoring the actuator line theory to the simulation of Vertical-Axis Wind Turbines", Energy Conversion and Management, Volume 243, 2021, 114422

[2021]

Some Design Guidelines to Adapt a Darrieus Vertical Axis Turbine for Use in Hydrokinetic Applications

<https://doi.org/10.1051/e3sconf/202131208017>.

Balduzzi, F., Melani, P. F., Soraperra, G., Brighenti, A., Battisti, L., and Bianchini, A., 2021, "Some Design Guidelines to Adapt a Darrieus Vertical Axis Turbine for Use in Hydrokinetic Applications," E3S Web Conf., **312**, p. 08017

[2021]

Development and Validation of an Advanced Actuator Line Model for Wind Turbines

<https://doi.org/10.1051/e3sconf/202131208004>.

Papi, F., Melani, P. F., Xie, S., Perrone, C., Scienza, P., Balduzzi, F., and Bianchini, A., 2021, "Development and Validation of an Advanced Actuator Line Model for Wind Turbines," E3S Web Conf., **312**, p. 08004

[2021]

Development of a Desmodromic Variable Pitch System for Hydrokinetic Turbines

<https://doi.org/10.1016/j.enconman.2021.114890>

Melani, P. F., Balduzzi, F., Ferrara, G., and Bianchini, A., 2021, "Development of a Desmodromic Variable Pitch System for Hydrokinetic Turbines," Energy Conversion and Management, **250**, p. 114890

[2021]

A Robust Procedure to Implement Dynamic Stall Models Into Actuator Line Methods for the Simulation of Vertical-Axis Wind Turbines

<https://doi.org/10.1115/1.4051909>

Melani, P. F., Balduzzi, F., and Bianchini, A. (September 27, 2021). "A Robust Procedure to Implement Dynamic Stall Models Into Actuator Line Methods for the Simulation of Vertical-Axis Wind Turbines." ASME. J. Eng. Gas Turbines Power. November 2021; 143(11): 111008.

[2022]

Power Augmentation of Darrieus Wind Turbine Blades Using Trapped Vortex Cavity

<https://doi.org/10.1016/j.jweia.2022.104949>

Ibrahim, A. A., Elbaz, A. M. R., Melani, P. F., Mohamed, O. S., and Bianchini, A., 2022, "Power Augmentation of Darrieus Wind Turbine Blades Using Trapped Vortex Cavity," *Journal of Wind Engineering and Industrial Aerodynamics*, **223**, p. 104949.

[2022]

Experimental Investigation of Mini Gurney Flaps in Combination with Vortex Generators for Improved Wind Turbine Blade Performance

<https://doi.org/10.5194/wes-7-943-2022>

Alber, J., Manolesos, M., Weinzierl-Dlugosch, G., Fischer, J., Schönmeier, A., Nayeri, C. N., Paschereit, C. O., Twele, J., Fortmann, J., Melani, P. F., and Bianchini, A., 2022, "Experimental Investigation of Mini Gurney Flaps in Combination with Vortex Generators for Improved Wind Turbine Blade Performance," *Wind Energy Science*, **7**(3), pp. 943–965.

[2022]

An Insight on the Key Factors Influencing the Accuracy of the Actuator Line Method for Use in Vertical-Axis Turbines: Limitations and Open Challenges

<https://doi.org/10.1016/j.enconman.2022.116249>

Mohamed, O. S., Melani, P. F., Balduzzi, F., Ferrara, G., and Bianchini, A., 2022, "An Insight on the Key Factors Influencing the Accuracy of the Actuator Line Method for Use in Vertical-Axis Turbines: Limitations and Open Challenges," *Energy Conversion and Management*, **270**, p. 116249