

Cacciola Stefano Ph.D.

curriculum vitae

PERSONAL SUMMARY

Stefano Cacciola received a PhD in “Rotary-wing Aircraft” in March 2013, at Politecnico di Milano in Milano, Italy.

He is a former member of the research and teaching staff of the Wind Energy Institute at the Technische Universität München (February 2014 - April 2016)

Since May 2016, he is a post-doc researcher at Politecnico di Milano and member of the POLI-Wind research group.

Expert in simulation, dynamics, aeroelasticity and control of mechanical systems with emphasis on wind turbines, aircraft and rotorcraft.

His research topics are focused on wind turbine modeling and analysis, with specific interest on identification, stability and health monitoring.

His teaching duties span from flight mechanics to wind turbine dynamics.

He has performed strong activity within both EU-financed programs and industrial projects to develop technological solutions for industrial needs.

WORK EXPERIENCE

Post-doc researcher

May 2016 – Present

Politecnico di Milano, Milano, Italy

Post-doc researcher

February 2014 – April 2016

Technische Universität München, Garching bei München, Germany

Research fellow then Ph.D. candidate then Post-doc researcher

March 2009 – January 2014

Politecnico di Milano, Milano, Italy

Research and academic duties

- Contributing to all system-identification-assisted research activities
 - ♦ Model parameter estimation for simulation, control, monitoring and testing
- Design of semi-active lead-lag dampers for helicopter rotors
- Scientific dissemination (journal and conference articles and consulting reports)
- Managing teaching duties (material preparation, teaching, tutoring and mentoring)

EDUCATION AND TRAINING

Ph.D. in Rotary-Wing Aircraft

March 2013. Politecnico di Milano, Milano, Italy.

Thesis title: *Wind Turbine System Identification and Stability Analysis*.

Esame di stato in Industrial Engineering

June 2009. Examination passed for state recognition as professional engineer

Laurea Specialistica (Master's degree) in Aeronautical Engineering

October 2008. Politecnico di Milano, Milano, Italy

Thesis: *Identificazione Parametrica dell'Aerodinamica del Velivolo AleniaAermacchi M346: Sperimentazione, Analisi, Validazione* (in Italian).

In cooperation with AleniaAermacchi S.p.A., Venegono Superiore (VA), Italy.

Laurea (Bachelor's degree) in Aerospace Engineering

September 2005. Politecnico di Milano, Milano, Italy

Thesis: *Un metodo di stabilizzazione non lineare per equazioni di diffusione e trasporto* (in Italian).

PERSONAL DATA

Affiliation and address

Dipartimento di Scienze e Tecnologie Aerospaziali

(Department of Aerospace Science and Technology)

Block B19 – Large Wind Tunnel

Via La Masa, 34

20156, Milano (MI), Italy

email

stefano.cacciola@polimi.it

phone

+39 0223998609 (Mobile)

nationality

Italian

AREAS OF EXPERTISE

System identification for aircraft and wind turbines

Wind energy

Simulation, aero-servo-elasticity of wind turbine system

Stability analysis of periodic systems with emphasis on wind turbine dynamics

Health monitoring techniques for wind turbine blade pitch system

Aeroelastic simulation of helicopter rotors

ACADEMIC ACTIVITIES

Teaching

- **Teacher of the course *Fondamenti di Meccanica del Volo Atmosferico***
B.Sc. in Aeronautical Engineering, 5 ECTS
Politecnico di Milano
 - A.Y.: from 2017/18 to present
- **Assistant of the course *Dinamica del Volo Atmosferico***
M.Sc. in Aeronautical Engineering, 10 ECTS
Politecnico di Milano
 - A.Y. 2018/2019, 2019/2020
- **Assistant of the course *Flight Dynamics***
M.Sc. in Aeronautical Engineering, 10 ECTS
Politecnico di Milano
 - A.Y. 2016/2017 and 2017/2018
- **Assistant of the course *Progetto di Velivoli/Progetto Generale di Velivoli***
M.Sc. Students in Aeronautical Engineering, 7.5/10 ECTS
Politecnico di Milano
 - A.Y. 2016/2017, 2010/2011 and 2011/2012
- **Teacher of the course *Introduction to Wind Energy***
B.Sc. in Mechanical engineering, 5 ECTS
Technische Universität München
 - A.Y. 2015/2016
- **Assistant of the course *Aeroelasticity***
M.Sc. Students in Mechanical engineering, 5 ECTS
Technische Universität München
 - A.Y. 2014/2015

Thesis Supervising and Tutoring

Supervisor

- Fabio Giovanni Parisi, Validation of a Superposed ROM for Wind Farm Control, December 2019. Dipartimento di Scienze e Tecnologie Aerospaziali, Politecnico di Milano.

Tutor of the following M.Sc. Theses

- Roberto Praticò, title to be defined, expected fall 2020
- Sebastiano Stipa, title to be defined, expected fall 2020
- Santiago Andres Ramirez Castillo, Engineering Models Enhancement for Wind Farm Wake Simulation and Optimization. Ottobre 2019. Dipartimento di Scienze e Tecnologie Aerospaziali, Politecnico di Milano.
- Assunta Bertozzi. CFD Analysis of Active Wake Mixing Strategies for Wind Farm Control. Luglio 2019. Dipartimento di Scienze e Tecnologie Aerospaziali, Politecnico di Milano.
- Umberto Tettamanti. A preliminary study on a wake mixing technique for wind farm control. Ottobre 2018, Dipartimento di Scienze e Tecnologie Aerospaziali, Politecnico di Milano.
- Andrea Bavetta. Flight mechanics modeling and control study of a three-surface aircraft. Luglio 2018, Dipartimento di Scienze e Tecnologie Aerospaziali, Politecnico di Milano.
- Bertelè Marta. Observation of Wind Inflow Conditions through Wind Turbine Loads. Agosto 2015, Wind Energy Institute, Technische Universität München.
- Issakova Aigul. Estimation of Wind Upflow, Misalignment and Vertical Shear from Rotor Loads: a Non-linear Approach. Marzo 2015, Wind Energy Institute, Technische Universität München.
- Castro Uriegas Daniel. Wind Turbine Loads and Power Performance Analysis for Faults and Rotor Imbalance Detection. Gennaio 2015, Wind Energy Institute, Technische Universität München.

LANGUAGES

Italian

Mother tongue

English

Full professional proficiencies

German

Elementary proficiency

ACADEMIC ACTIVITIES

Reviewer of the following journals

Renewable Energy

Wind Energy

Journal of Computational and Nonlinear Dynamics

Wind Energy Science

Electric Power System Research

- Schreiber Johannes. Wind Speed Sensing and Wake Detection from Wind Turbine Rotor Loads. Dicembre 2014, Wind Energy Institute, Technische Universität München.
- Riva Riccardo. Analytical and Numerical Periodic Stability Analysis of Wind Turbines. Ottobre 2013, Dipartimento di Scienze e Tecnologie Aerospaziali.
- Marrone Pasquale Marco. Identificazione parametrica delle caratteristiche aerodinamiche dei profili di un aerogeneratore. Luglio 2010, Dipartimento di Scienze e Tecnologie Aerospaziali, Politecnico di Milano.
- Sacchetti Alice e Trimarco Andrea. Model updating on Wind Turbine Blades Using Maximum Likelihood Constrained Optimization. Dicembre 2009, Dipartimento di Scienze e Tecnologie Aerospaziali, Politecnico di Milano.

PERSONAL QUALITIES

Tutor of the following B.Sc. Theses

- Camps Pons Carlos. Fault Detection and Condition Monitoring for Wind Turbines Using Rotor Loads: a Preliminary Study. Agosto 2015, Wind Energy Institute, Technische Universität München.

Tutor of the following Semesterarbeiten (semestral work)

- Munduate Agud Irene. Pitch Misalignment Detection in Wind Turbines using Neural Networks: Scenarios and Methods. Aprile 2016, Wind Energy Institute, Technische Universität München.
- Schreiber Johannes. Development of a Blade Load-Based Wind Speed and Turbulence Intensity Estimator for Wind Turbines. Aprile 2014, Wind Energy Institute, Technische Universität München.

Mentor of the following Ph.D. thesis

- Schreiber Johannes. *Title to be defined*. Expected for the end of 2018, Wind Energy Institute, Technische Universität München.

Problem solving
Able to perform training and mentoring
Able to explain technical data to non-technical persons
Attention to detail
Can Do attitude
Motivated
Team working and leading
Articulate and tactful

PUBLICATIONS

Indexed Papers (Scopus/Web Of Science)

- M. Bertelè, C.L. Bottasso, S. Cacciola. Brief communication: Wind inflow observation from load harmonics - wind tunnel verification of the rotationally symmetric formulation. *Wind Energy Science* 4(1): 89-97, 2019.
- M. Bertelè, C.L. Bottasso, S. Cacciola. Automatic detection and correction of pitch misalignment in wind turbine rotors. *Wind Energy Science* 3(2):791-803. 2018
- S. Cacciola, C.E.D. Riboldi, A. Croce. Monitoring rotor aerodynamic and mass imbalances through a self-balancing control. *Journal of Physics Conference Series* 1037(3):032041, 2018
- M. Bertelè, C.L. Bottasso, S. Cacciola. Simultaneous estimation of wind shears and misalignments from rotor loads: formulation for IPC-controlled wind turbines. *Journal of Physics Conference Series* 1037(3):032007. 2018
- R. Riva, S. Cacciola, A. Croce. High-resolution periodic mode shapes identification for wind turbines. *Journal of Physics Conference Series* 1037(6):062002, 2018
- R. Riva, M. Spinelli, L. Sartori, S. Cacciola, A. Croce. Stability analysis of wind turbines with bend-twist coupled blades. *Journal of Physics Conference Series* 1037(6):062014, 2018
- C.L. Bottasso, S. Cacciola, J. Schreiber. Local wind speed estimation, with application to wake impingement detection. *Renewable energy* 116:155-168, 2018
- M. Bertelè, C.L. Bottasso, S. Cacciola, F. Daher Adegas, S. Delpont. Wind inflow observation from load harmonics. *Wind Energy Science.*, 2, 615-640, 2017
- C.E.D. Riboldi, S. Cacciola. Individual pitch control for 2-bladed wind turbines via multi-blade multilag transformation. *Wind Energy* 20(12):1955-1969, 2017
- S. Cacciola, C.E.D. Riboldi. Equalizing Aerodynamic Blade Loads Through Individual Pitch Control Via Multi-Blade Multi-Lag Transformation. *Journal of Solar Energy Engineering, Transactions of the ASME* 139(6),061008, 2017
- S. Cacciola, C.E.D. Riboldi, A. Croce. A New Decentralized Pitch Control Scheme for Wind Turbines *IFAC-PapersOnLine* 50(1), pp. 9908-9913
- M. Bertelè, C.L. Bottasso, S. Cacciola, M. Domestici. Automatic track and balance of wind turbine rotors. *WCCM 2017 - 1st World Congress on Condition Monitoring 2017*
- R. Riva, S. Cacciola, C. L. Bottasso. Periodic stability analysis of wind turbines operating in turbulent wind conditions. *Wind Energy Science* 1(2):177-203, 2016.

- S. Cacciola, I. Munduate Agud, C.L. Bottasso, Detection of Rotor Imbalance, Including Root Cause, Severity and Location. *Journal of Physics: Conference Series* 753(7):072003, 2016.
- S. Cacciola, M. Bertelè, C.L. Bottasso, Simultaneous Observation of Wind Shears and Misalignments from Rotor Loads. *Journal of Physics: Conference Series* 753(5):052005, 2016.
- S. Cacciola, M. Bertelè, J. Schreiber, C.L. Bottasso, Wake Center Position Tracking using Downstream Wind Turbine Hub Loads. *Journal of Physics: Conference Series* 753(3):032036, 2016.
- R. Riva, S. Cacciola, C.L. Bottasso, A MIMO Periodic ARX Identification Algorithm for the Floquet Stability Analysis of Wind Turbines. *Journal of Physics: Conference Series* 753(4):042015, 2016.
- J. Schreiber, S. Cacciola, F. Campagnolo, V. Petrović, C.L. Bottasso. Wind Shear Estimation and Wake Detection by Rotor Loads - First Wind Tunnel Verification. *Journal of Physics: Conference Series* 753(3):032027, 2016.
- C.L. Bottasso, S. Cacciola, F. Campagnolo, J. Schreiber. Wake detection for wind farm control - formulation and validation. 34th Wind Energy Symposium, San Diego, California, USA, January 2016.
- C.L. Bottasso, S. Cacciola. Model-independent periodic stability analysis of wind turbines. *Wind Energy* 18(5):865-887, 2015.
- C.L. Bottasso, S. Cacciola, J. Schreiber. A wake detector for wind farm control. *Journal of Physics: Conference Series* 625(1): 012007, 2015.
- C.L. Bottasso, S. Cacciola, R. Riva. Floquet stability analysis of wind turbines using input-output models. 32nd ASME Wind Energy Symposium - SciTech Forum and Exposition, National Harbor, MD, USA, January 2014.
- C.L. Bottasso, S. Cacciola, X. Iriarte. Calibration of wind turbine lifting line models from rotor loads. *Journal of Wind Engineering and Industrial Aerodynamics* 124:29-45, 2014.
- C.L. Bottasso, S. Cacciola, A. Croce. Estimation of Blade Structural Properties from Experimental Data. *Wind Energy* 16(4):501-518, 2013.
- C.L. Bottasso, S. Cacciola. Periodic stability analysis of wind turbines. *European Wind Energy Conference and Exhibition 2012, EWEC 2012 2*: 1021-1028.
- C.L. Bottasso, S. Cacciola, A. Croce, L. Dozio. Load Reduction in Lead-Lag Dampers by Speed-Scheduled Aperture and Modulated Control of a Bypass Valve. *Journal of the American Helicopter Society* 57(2):16-28, 2012.
- C.L. Bottasso, S. Cacciola, A. Croce, L. Dozio. Load Reduction in Lead-Lag Dampers by Speed-Scheduled Aperture and Modulated Control of a Bypass Valve. *Annual Forum Proceedings - AHS International*, 2010.

Papers under review

- J. Frederik, R. Weber, S. Cacciola, F. Campagnolo, A. Croce, C.L. Bottasso, J.-W. van Wingerden. Periodic dynamic induction control of wind farms: proving the potential in simulations and wind tunnel experiments. *Wind Energy Science Discussion*, <https://doi.org/10.5194/wes-2019-50>, *in review*, 2019.

Book chapters

- L. Sartori, S. Cacciola, A. Croce, C.E.D. Riboldi. A research framework for the multi-disciplinary design and optimization of wind turbines. In: *Optimization of Wind Energy Conversion Systems*. *In review*.

Patent

- F. Daher Adegas, S.S.L. Delpont, C.L. Bottasso, S. Cacciola, System and Method for Controlling Wind Turbines. US20170175709 A1, Jun 22nd, 2017.

Titles of Theses

- S. Cacciola. Wind turbine system identification and stability analysis, Dipartimento di Scienze e Tecnologie Aerospaziali, March 26th, 2013. Ph.D. thesis.
- S. Cacciola. Identificazione Parametrica dell'Aerodinamica del Velivolo AleniaAermacchi M346: sperimentazione, Analisi, Validazione (In Italian). Dipartimento di Ingegneria Aerospaziale, October 23rd, 2008. 'Laurea Magistrale' (M.Sc.) thesis
- S. Cacciola. Un metodo di stabilizzazione non lineare per equazioni di diffusione-trasporto (In Italian). Dipartimento di Ingegneria Aerospaziale, September 28th, 2005. 'Laurea' (B.Sc.) thesis.

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