



# ALESSANDRO BONGARZONE

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Born August 20, 1994, in Narni (TR), Italy

## CURRENT EMPLOYMENT

### Post-doctoral researcher

ONERA The French Aerospace Lab  
Department of Aerodynamics, Aeroelasticity & Acoustics (DAAA)  
Project title: *Mean resolvent analysis of strongly compressible jet flows*  
Supervisors: Dr. Colin Leclercq, Dr. Cédric Content & Prof. Denis Sipp

Dec 2023 – Present  
Meudon, Île-de-France, France

## EDUCATION

### Doctoral School of Mechanical Engineering

École Polytechnique Fédérale de Lausanne (EPFL)  
Dissertation title:

*Self-sustained dynamics and forced resonant oscillations in flows: cross-junction jets and sloshing liquids*

Supervisor: Prof. François Gallaire

Jun 2019 – Sep 2023  
Lausanne, Switzerland

### Master's Degree in Aerospace Engineering

University of Pisa

Thesis title: *Sloshing waves and Faraday instability: contact line behaviour and static meniscus*

Supervisor: Prof. Simone Camarri

Final Mark: 110/110 cum laude

Sep 2016 – Apr 2019  
Pisa, Italy

- Research Internship at École Polytechnique Fédérale de Lausanne (EPFL)  
Seven months project on *Sloshing wave dynamics and Faraday instability*  
at Laboratory of Fluid Mechanics and Instabilities (LFMI).  
Tutored by Prof. François Gallaire and Dr. Lorenzo Siconolfi

Sep. 2018 - Mar. 2019  
Lausanne, Switzerland

### Bachelor's Degree in Aerospace Engineering

University of Pisa

Thesis title: *Flow through a constant area duct with friction: Fanno flow*

Supervisor: Prof. Maria Vittoria Salvetti

Sep 2013 – Oct 2016  
Pisa, Italy

### Scientific High School Diploma

I.I.S.S. Gandhi of Narni

Sep 2008 – Jul 2013  
Narni, Italy

## LICENSES AND CERTIFICATES

### Deep Learning Specializations (Coursera)

<https://www.coursera.org/account/accomplishments/specialization/certificate/WXQVWVWAF325>

- Sequence Models
- Convolutional Neural Networks
- Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization
- Structuring Machine Learning Projects
- Neural Networks and Deep Learning

Feb 2022  
online

### Machine Learning (Coursera)

<https://www.coursera.org/account/accomplishments/certificate/8CDGUXB5BKTS>

Jan 2022  
online

### European Computer Driving Licence (ECDL), AICA

issued by I.I.S.S. Gandhi of Narni (AAD-01). SKILLS CARD: IT-2245990

March 2010  
Narni, Italy

## ADDITIONAL SCHOOLS AND TRAININGS

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<b>Security, Safety and Facilities Operations, Occupational Health &amp; Safety, COSEC</b> École Polytechnique Fédérale de Lausanne (EPFL)	2020-2023 Lausanne, Switzerland
<b>Python for Data Science and Machine Learning (Learning &amp; Development)</b> École Polytechnique Fédérale de Lausanne (EPFL)	21-23, Sep 2022 online
<b>Python Fundamentals (Learning &amp; Development)</b> École Polytechnique Fédérale de Lausanne (EPFL)	21-23, Feb 2022 online
<b>Model Order Reduction Summer School (MORSS 2020)</b> Organized by École Polytechnique Fédérale de Lausanne (EPFL) and Eidgenössische Technische Hochschule (ETH)	7-10, Sep 2020 online
<b>International Summer School <i>Complex Motion in Fluids</i></b> Technical University of Denmark (DTU)	18-24, Aug 2019 Kysthusene Gilleleje, Denmark

## AWARDS

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<b>Gallery of Fluid Motion Award</b> V0036: "Swinging Jets", DOI: <a href="https://doi.org/10.1103/APS.DFD.2019.GFM.V0036">https://doi.org/10.1103/APS.DFD.2019.GFM.V0036</a> 72 <sup>th</sup> Annual Meeting of the APS Division of Fluid Dynamics (DFD)	Nov 2021 Seattle, WA, USA
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## SERVICE

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**Journal referee for:** Journal of Fluid Mechanics  
Physical Review Fluids  
Proceedings of The Royal Society A  
Applied Physics Letter

## SKILLS

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**Languages:** Italian (native), English (fluent), French (intermediate)  
**Programming:** Python, Matlab, Simulink, Mathematica, Fortran (basic)  
**Softwares:** Nek5000, FreeFem++, COMSOL, ANSYS-Fluent, OpenFOAM (basic), Gmsh, Paraview, ImageJ  
**Document Creation:** Microsoft Office Suite (Excel, Word, PowerPoint), Adobe Creative Suite (Illustrator, Photoshop), LaTeX

## Peer-reviewed journal articles

- BONGARZONE, A. & GALLAIRE, F. (2024) Lagrangian vs Eulerian view on the mean drift and streaming flows in orbital sloshing. Under revision in *Phys. Rev Fluids*, DOI: <https://doi.org/10.48550/arXiv.2407.03438>
- BONGARZONE, A. & GALLAIRE, F. (2024) Stick-slip to stick transition induced by contact angle hysteresis in U-shaped tubes: a projection method. *Phys. Rev. Fluids* **9**, 034401 DOI: <https://doi.org/10.1103/PhysRevFluids.9.034401>
- BONGARZONE, A., JOURON, B., VIOLA, F. & GALLAIRE, F. (2023) A revised gap-averaged Floquet analysis for Faraday waves in Hele-Shaw cells. *J. Fluid Mech.* **977**, DOI: <https://doi.org/10.1017/jfm.2023.986>
- MARCOTTE, A., GALLAIRE, F. & BONGARZONE, A. (2023) Swirling against the forcing: evidence of stable counter-directed sloshing waves in orbital-shaken reservoirs. *Phys. Rev. Fluids* **8**, 084802 DOI: <https://doi.org/10.1103/PhysRevFluids.8.084802>
- CARUSO LOMBARDI, F., BONGARZONE, A., ZAMPOGNA, G. A., GALLAIRE, F., CAMARRI, S. & LEDDA P. G. (2023) Von Kármán vortex street past a permeable circular cylinder: Two-dimensional flow and dynamic-mode-decomposition-based secondary stability analysis. *Phys. Rev. Fluids* **8**, 083901 DOI: <https://doi.org/10.1103/PhysRevFluids.8.083901>
- MARCOTTE, A., GALLAIRE, F. & BONGARZONE, A. (2023) Super-harmonically resonant swirling waves in longitudinally forced circular cylinders. *J. Fluid Mech.* **966**, DOI: <https://doi.org/10.1017/jfm.2023.438>
- BONGARZONE, A., VIOLA, F., CAMARRI, S. & GALLAIRE, F. 2022 Sub-harmonic parametric instability in nearly-brimful circular cylinders: a weakly nonlinear analysis. *J. Fluid Mech.* **947**, DOI: <https://doi.org/10.1017/jfm.2022.600>
- BONGARZONE, A., GUIDO, M. & GALLAIRE F. 2022 An amplitude equation modeling the double-crest swirling in orbital shaken cylindrical containers. *J. Fluid Mech.* **943**, DOI: <https://doi.org/10.1017/jfm.2022.440>
- BONGARZONE, A., VIOLA, F. & GALLAIRE, F. 2021 Relaxation of capillary-gravity waves due to contact line nonlinearity: A projection method. *Chaos* **31** (12), 123124, DOI: <https://doi.org/10.1063/5.0055898>
- BONGARZONE, A., BERTSCH, A., RENAUD, P. & GALLAIRE, F. 2021 Impinging planar jets: hysteretic behaviour and origin of the self-sustained oscillations. *J. Fluid Mech.* **913**, DOI: <https://doi.org/10.1017/jfm.2021.51>
- BERTSCH, A., BONGARZONE, A., YIM, E., RENAUD, P. & GALLAIRE, F. 2020 Swinging jets. *Phys. Rev. Fluids* **5** (11), 110505, DOI: <https://doi.org/10.1103/PhysRevFluids.5.110505>
- BERTSCH, A., BONGARZONE, A., DUCHAMP, M., RENAUD, P. & GALLAIRE, F. 2020 Feedback-free microfluidic oscillator with impinging jets. *Phys. Rev. Fluids* **5** (5), 054202, DOI: <https://doi.org/10.1103/PhysRevFluids.5.054202>

## CONFERENCES CONTRIBUTIONS

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- Modelling the wave-induced mean flow in orbital sloshing** Sep 2024  
1<sup>st</sup> European Fluid Dynamics Conference (EFDC1) (speaker: T. Fullana, EPFL) Aachen, Germany
- Mean resolvent analysis of a hot axisymmetric jet** Jun 2024  
Coherent structures in aeroacoustics: SIG 39-ERCOFTAC Symposium Rome, Italy
- A revised gap-averaged model of Faraday waves in Hele-Shaw cells** Jun 2023  
15<sup>th</sup> SIG 33-ERCOFTAC Workshop Alghero, Italy
- Symmetry-breaking swirling waves in longitudinally forced cylindrical containers** Nov 2022  
75<sup>th</sup> Annual Meeting of the APS Division of Fluid Dynamics (DFD) Indianapolis, IN, USA
- Stick-slip to stick transition induced by contact angle hysteresis in U-shaped tubes: a projection method** Sep 2022  
14<sup>th</sup> European Fluid Mechanics Conference (EFMC14) Athens, Greece
- Amplitude equation model for prediction of super-harmonic double-crest wave dynamics in orbital shaken cylindrical containers** Nov 2021  
74<sup>th</sup> Annual Meeting of the APS Division of Fluid Dynamics (DFD) Phoenix, AZ, USA
- The role of a capillary meniscus on the Faraday instability** Aug 2021  
25<sup>th</sup> International Congress of Theoretical and Applied Mechanics (ICTAM) (speaker: F. Gallaire) Milano, Italy
- Impinging planar jets: hysteretic behaviour and origin of the self-sustained oscillations** Nov 2020  
73<sup>th</sup> Annual Meeting of the APS Division of Fluid Dynamics (DFD) (online) Chicago, IL, USA
- Nonlinear damping of sloshing motion caused by a piece-wise linear contact line model** Nov 2020  
73<sup>th</sup> Annual Meeting of the APS Division of Fluid Dynamics (DFD) (online) (speaker: F. Gallaire) Chicago, IL, USA
- Swinging jets (contribution V0036 to the Gallery of Fluid Motion contest)** Nov 2019  
72<sup>th</sup> Annual Meeting of the APS Division of Fluid Dynamics (DFD) Seattle, WA, USA
- Faraday instability: effect of the static meniscus (poster presentation)** Aug 2019  
9<sup>th</sup> International Summer School *Complex Motion in Fluids* Kysthusene Gilleleje, Denmark

## INFORMAL TALKS AND SEMINARS

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- Super-harmonically resonant swirling waves in longitudinally forced cylinders** Nov 2022  
At Complex Fluids Group – Princeton University – hosted by Prof. H.A. Stone  
At Brun Lab – Princeton University – hosted by Prof. P.-T. Brun  
At Deike Lab – Princeton University – hosted by Prof. L. Deike  
Princeton, NJ, USA
- Faraday waves** May 2022  
At Gran Sasso Science Institute (GSSI)  
L'Aquila, Italy

## TEACHING AND STUDENTS SUPERVISION

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### Teaching Assistant

- \* *Hydrodynamics* Master course in Mechanical Engineering at EPFL  
35 total hours Spring 2022
- \* *Numerical Flow Simulations* Master course in Mechanical Engineering at EPFL  
130 total hours (softwares used: ANSYS – Workbench, Fluent, SpaceClaim) Fall 2020, 2021, 2022
- \* *Numerical Methods in Biomechanics* Master course in Mechanical Engineering at EPFL  
45 total hours (softwares used: COMSOL Multiphysics) Spring 2020, 2021

### Master Thesis Supervisor

- \* Tutored one visiting student from University of Pisa at EPFL  
Title of the project: *Three- dimensional instability of the von Karman vortex street past a porous cylinder*  
85 total hours Sep 2021 – Mar 2022
- \* Tutored one student at EPFL  
Title of the project: *Modeling hysteresis in orbital sloshing*  
120 total hours Spring 2021
- \* Tutored one visiting Master student from École Polytechnique at EPFL  
Title of the project: *Stability of fluidic oscillators*  
20 total hours Spring 2021

### Semester Project Supervisor

- \* Tutored one Master student at EPFL  
Title of the project: *Faraday waves in an annular Hele-Shaw cell*  
50 total hours Spring 2023
- \* Tutored one Master student at EPFL  
Title of the project: *Capillary-gravity waves: effect of a circular corral*  
35 total hours Spring 2022
- \* Tutored one Master student at EPFL  
Title of the project: *Effect of a variable slip-length wall-condition on the damping of two-dimensional sloshing waves*  
30 total hours Spring 2019

Paris, July 22, 2024

