

CR HDR. Lionel Agostini

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Google scholar

github.com/LionelAgo

Current employment

Since **Researcher - CNRS**

2020 Pprime institute - Fluids, Thermal and Combustion Department - CURIOSITY

Research experience

- 2019-2020 **Research associate**, Imperial College London, Department of Aeronautics, London, U.K.,
“High-Fidelity LES/DNS Data for Innovative Turbulence Models .
supervisor : Prof. Peter Vincent - funding : EU project - [HIFI-TURB](#)
- 2016-2019 **Research associate**, Imperial College London, Department of Aeronautics, London, U.K.,
“near-wall turbulence and drag reduction at high Reynolds number .
supervisor : Prof. Michael Leschziner - funding : EU-China project [DRAGY](#)
- 2014-2017 **Research associate**, Ohio State University, Department of Aeronautics, Columbus, USA.,
“near-wall turbulence, shockwave /boundary layer interaction, jet .
supervisor : Prof. Datta Gaitonde
- 2013-2014 **Research associate**, Imperial College London, Department of Aeronautics, London, U.K.,
“Control of Görtler vortices.
supervisor : Dr. George Papadakis - funding : EPSRC
- 2012-2013 **Research associate**, Imperial College London, Department of Aeronautics, London, U.K.,
“Drag reduction in turbulent channel flow by oscillatory spanwise motion.
supervisor : Prof. Michael Leschziner - funding : EPSRC
- 2011-2012 **Research associate**, IUSTI, Aix-Marseille University, Marseille, France, “Unsteadiness in separated supersonic flow.
supervisor : Prof. Jean-Paul Dussauge - funding : State grant
- 2008-2011 **Research assistant**, IUSTI, Aix-Marseille University, Marseille, France, “Unsteadiness in separated supersonic flow.
supervisor : Prof. Jean-Paul Dussauge - funding : State grant
- 2008 **Master Degree, research project**, Laboratoire Fluides, Automatique et Systèmes Thermiques (FAST), Orsay, France, “Statistical study of turbulence in rotation.
supervisor : Prof. Frédéric Moisy
- 2007 **Master Degree, research project**, Institut Universitaire des Systèmes Thermiques Industriels (IUSTI), Marseille, France, “Development of an algorithm to correct PIV fields from POD.
supervisor : Dr. Pierre Dupont

Education

- 2024 **HDR**, *Fluid Mechanics*, Poitiers University, Poitiers, France.
- 2008–2011 **PhD**, *Fluid Mechanics*, IUSTI, Supersonic Research Group, Aix-Marseille University, Marseille, France.
Distinction : The highest honors
- 2007–2008 **Research Master Degree - (Master recherche)**, *Fluid dynamics, Aero-acoustics*, Paris Sud University, Orsay, France.
Grade : Bien - Rank : 1/30
- 2005–2006 **Bachelor degree - (Licence)**, *in Physics*, Aix-Marseille University, Marseille, France.
Grade : Bien

Research interests and skills

Research : -Fluid Mechanics
-Compressible/incompressible flows
-Control
-Turbulence
-Drag reduction
-Unsteady separated flows
-Direct Numerical Simulation (DNS), Large Eddy Simulation (LES)

Languages : -French (mother tongue)
-English

Programming : Matlab, Python, Julia, Tensorflow, Keras & Fortran

Machine learning projects

Exploring and predicting flow dynamic (github.com/LionelAgo/):

- Auto-Encoder
- Clustering
- Defining Low-dimensional model (Markov chain)
- Prediction
- Sparse reconstruction

Teaching experience & Supervision

- 2011-2012 **Teaching Associate**, *Ecole Polytech Universitaire de Marseille*, Marseille,
Mathematics (*differential equations, Fourier series, Multi-variable function*).
Experimental work (*laminar/turbulent transition, centrifugal pumps, wave flume and open channel flow*).
- 2008–2011 **Teaching Assistant**, *Ecole Polytechnique Universitaire de Marseille*, Marseille,
Fluid mechanics (*Navier-Stokes equations, dimensional analysis...*).
- 2014-2016 **Joint supervisor**, *Phd candidates and Master graduate students*, Ohio-State university.

Administrative tasks

- Since 2021 **Member of Evaluating Scientific Committee (CES 60) - University of Poitiers**, Poitiers, France.
- Since 2020 **Member of Pprime communication committee**, Poitiers, France.

2009-2012 Elected student member in laboratory council, *Marseille, France*.

Publications - 23 (20 Rank A, highlighted in yellow)

Boundary layer theory :

- 2022 "Auto-encoder-assisted analysis of amplitude and wavelength modulation of near-wall turbulence by outer large-scale structures in channel flow at friction Reynolds number of 5200",
Physics of Fluids, 34,
L. Agostini & M. A. Leschziner .
- 2019 "On the departure of near-wall turbulence from the quasi-steady state",
Journal of Fluid Mechanics, 871,
L. Agostini & M. A. Leschziner .
- 2019 "The connection between the spectrum of turbulent scales and the skin-friction statistics in channel flow at $Re_\tau \approx 1000$ ",
Journal of Fluid Mechanics, 871,
L. Agostini & M. A. Leschziner .
- 2017 "Multi-scale interactions in a compressible boundary layer",
Journal of Turbulence, 18(8) 760,
L. Agostini, M. A. Leschziner, J Poggie, NJ Bisek & D. Gaitonde .
- 2017 "Spectral analysis of near-wall turbulence in channel flow at $Re_\tau = 4200$ with emphasis on the attached-eddy hypothesis",
Physical Review Fluids, 2(1) :014603,
L. Agostini & M. A. Leschziner .
- 2016 "On the validity of the quasi-steady-turbulence hypothesis in representing the effects of large scales on small scales in boundary layers",
Physics of fluids, 28(4) :045102,
L. Agostini & M. A. Leschziner .
- 2016 "Skewness-induced asymmetric modulation of small-scale turbulence by large-scale structures",
Physics of fluids, 28(1) :015110,
L. Agostini, M. A. Leschziner & D. Gaitonde.
- 2016 "Predicting the response of small-scale near-wall turbulence to large-scale outer motions",
Physics of fluids, 28(1) :015107,
L. Agostini & M. A. Leschziner.
- 2014 "On the influence of outer large-scale structures on near-wall turbulence in channel flow",
Physics of fluids, 26(7) :075107,
L. Agostini & M. A. Leschziner.

Drag reduction :

- 2021 "Statistical analysis of outer large-scale/inner-layer interactions in channel flow subjected to oscillatory drag-reducing wall motion using a multiple-variable joint PDF methodology",
Journal of Fluid Mechanics, 923,
L. Agostini & M. A. Leschziner .
- 2018 "The impact of footprints of large-scale outer structures on the near-wall layer in the presence of drag-reducing spanwise wall motion",
Journal of Flow, Turbulence and Combustion, 1–25,
L. Agostini & M. A. Leschziner .

- 2014 "The turbulence vorticity as a window to the physics of friction-drag reduction by oscillatory wall motion ",
[*International Journal of Heat and Fluid Flow*](#), 09/2014(51),
L. Agostini, E. Toubert, M. A. Leschziner.
- 2014 "Spanwise oscillatory wall motion in channel flow: Drag-reduction mechanisms inferred from DNS-predicted phase-wise property variations at $Re_\tau = 1000$ ",
[*Journal of Fluid Mechanics*](#), 743 :606,
L. Agostini, E. Toubert, M. A. Leschziner.

Heat transfer :

- 2024 "Preferential Enhancement of Convective Heat Transfer Over Drag Via Near-Wall Turbulence Manipulation Using Spanwise Wall Oscillations ",
[*International Journal of Heat and Fluid Flow*](#) , 1010 :109564, issn :0142-727X ,
 L. Guérin, C. Flageul, L. Cordier, S. Grieu, & **L. Agostini** .
- 2024 "Breaking the Reynolds Analogy: Decoupling Turbulent Heat and Momentum Transport via Spanwise Wall Oscillation in Wall-Bounded Flow ",
[*arXiv preprint*](#) , 2312.13002,
 L. Guérin, C. Flageul, L. Cordier, S. Grieu, & **L. Agostini** .

Machine learning :

- 2024 "Catching up with missing particles",
[*Nature Machine Intelligence*](#), 6,
 S. Atis & **L. Agostini** .
- 2020 "Exploration and prediction of fluid dynamical systems using Auto-Encoder technology",
[*Physics of fluids*](#), 32(6) :067103,
L. Agostini .

Shock-wave and boundary layer interaction :

- 2020 "Dynamics of separation bubble dilation and collapse in shock wave/turbulent boundary layer interactions", [*Shock Waves*](#), 30, 63–75.
 M. Waïndim, **L. Agostini**, L. Larchevêque & D. Gaitonde
- 2015 "Mechanism of shock unsteadiness in separated shock/boundary-layer interactions ",
[*Physics of fluids*](#), 27(12) :126103,
L. Agostini, L. Larchevêque & P. Dupont .
- 2012 "Zones of influence and shock boundary layer interaction",
[*AIAA Journal*](#), 50(6) :1377,
L. Agostini, L. Larchevêque, P. Dupont, J.-F. Debiève & J.-P. Dussauge.
- 2012 "Numerical study of three-dimensional modulations in a shock-induced separation ",
[*Progress in Flight Physics*](#), 3, pp157–168,
L. Agostini, L. Larchevêque, E. Garnier & E. De Martel.
- 2011 "Numerical study of a shock - turbulent boundary layer interaction with incipient and complete separation",
[*International Journal of Engineering System Modeling and Simulation*](#), 3(1/2) :46,
L. Agostini, P. Dupont, L. Larchevêque & J.-P. Dussauge.

Supersonic jet :

- 2017 "Directivity and intermittency in the nearfield of a Mach 1.3 jet ",
[*International Journal of Aeroacoustics*](#), 16(3) :135,
 S. Unnikrishnan, D. Gaitonde & **L. Agostini** .

Oral communication with peer-reviewed proceedings

- April 2024 **L. Guérin, C. Flageul, L. Cordier, S. Grieu, L. Agostini** & , "Breaking the Reynolds Analogy: Decoupling Turbulent Heat and Momentum Transport via Spanwise Wall Oscillation in Wall-Bounded Flow ", DLES , 14.
Erlangen, Germany
- March 2024 **L. Guérin, C. Flageul, L. Cordier, S. Grieu, L. Agostini** & , "Breaking the Reynolds Analogy: Decoupling Turbulent Heat and Momentum Transport via Spanwise Wall Oscillation in Wall-Bounded Flow ", EUROMECH, COLLOQUIUM 631.
Madrid, Spain
- April 2023 **L. Agostini** & **M. A. Leschziner** , "A predictive model for the response of near-wall turbulence to outer structures ", ETC 15.
Budapest, Hungary
- July 2022 **L. Agostini** & **M. A. Leschziner** , "Analysis of large-scale/small-scale interactions in turbulent channel flow using Auto-Encoder combined with Multivariate-Pdf ", TSFP , 12.
Osaka, Japan
- August 2018 **L. Agostini** & **M. A. Leschziner** , "Features of eddies populating the meso-layer in a wall-bounded flow", EUROMECH, COLLOQUIUM 598.
London, UK
- September 2018 **L. Agostini** & **M. A. Leschziner** , "Controlling the influence of outer large-scale structures on wall friction ", ETMM 12.
Montpellier, France
- January 2018 **A.T Mohan** & **L. Agostini** , "A statistical insight into the onset of deep dynamic stall using multivariate empirical mode decomposition", Proc. 56th AIAA Aerospace Sciences Meeting.
Kissimmee, Florida, USA
- July 2017 **L. Agostini** & **M. A. Leschziner** , "Inferring the structural properties of eddies in the log layer from spectral statistics ", TSFP10.
Chicago,, USA
- June 2016 **S. Sengupta, L. Agostini** & **D. Gaitonde** , "Effect of Asymmetric Nozzle Configuration on Jet Flow Characteristics ", Proc. 46th AIAA Fluid Dynamics Conference.
Washington, D.C, USA
- January 2016 **L. Agostini, M. Leschziner, J. Poggie, N.J Bisek** & **D Gaitonde** , "Causal relationship between large outer structures and small-scale near-wall turbulence in a compressible boundary layer at Mach= 2.3", Proc. 54th AIAA Aerospace Sciences Meeting.
San Diego, California, USA
- January 2016 **A.T Mohan, L. Agostini, M.R Visbal** & **D. Gaitonde** , "A Preliminary Spectral Decomposition and Scale Separation Analysis of a High-Fidelity Dynamic Stall Dataset", Proc. 54th AIAA Aerospace Sciences Meeting.
San Diego, California, USA
- January 2016 **S. Unnikrishnan, L. Agostini** & **D. Gaitonde** , "Scale-specific Intermittency and Spatio-temporal Correlations in a Supersonic Jet ", Proc. 54th AIAA Aerospace Sciences Meeting.
San Diego, California, USA
- January 2016 **M. Waindim, L. Agostini, L. Larchèveque** & **D. Gaitonde** , "Conditional analysis of unsteadiness in shock boundary layer interactions ", Proc. 54th AIAA Aerospace Sciences Meeting.
San Diego, California, USA
- January 2016 **C.M Stack, D. Gaitonde, L. Agostini, M.G Berry, A.S Magstadt** & **M.N Glauser** , "Numerical Investigation of a Supersonic Multistream Jet with an Aft-Deck ", Proc. 54th AIAA Aerospace Sciences Meeting.
San Diego, California, USA

- January 2016 **S. Sengupta**, **L. Agostini**, **S. Unnikrishnan** & **D. Gaitonde** , “Investigation of Rectangular Jet Issuing From a Varying Cross-Section Nozzle ”, Proc. 54th AIAA Aerospace Sciences Meeting. San Diego, California, USA
- August 2015 **L. Agostini** & **M. Leschziner** , “Predicting the response of small-scale near-wall turbulence to large-scale outer motions ”, 15th ETC . Delft, Netherlands
- June 2015 **A.T Mohan**, **L. Agostini**, **D. Gaitonde** & **D.J Garmann**, “Statistical Analysis and Model Reduction of Surface Pressure in the Interaction of a Streamwise-Oriented Vortex with a Wing ”, Proc. 22nd AIAA Computational Fluid Dynamics Conference. Dallas, Texas, USA
- June 2015 **S. Unnikrishnan**, **L. Agostini** & **D. Gaitonde** , “Analysis of Intermittency of Supersonic Jet Noise with Synchronized LES ”, Proc. 22nd AIAA Computational Fluid Dynamics Conference. Dallas, Texas, USA
- September 2014 **L. Agostini**, **M. A. Leschziner**, “On the influence of outer large-scales structures on near-wall turbulence in channel flow ”, Proc. 10th International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements. Marbella, Spain
- July 2014 **L. Lu**, **L. Agostini**, **P. Ricco**, **G. Papadakis**, “Optimal state feedback control of streaks and Görtler vortices induced by free-stream vortical disturbances ”, Proc. 10th UKACC International Conference on Control. Loughborough, UK
- August 2013 **L. Agostini**, **E. Touber**, **M. A. Leschziner**, “Spanwise oscillatory wall motion in channel flow : drag-reduction mechanisms inferred from DNS-predicted phase-wise property variations at $Re_\tau = 1000$ ”, Proc. International Symposium On Turbulence and Shear Flow Phenomena. Poitiers, France
- August 2013 **L. Agostini**, **L. Larchevêque** , **P. Dupont**, “Features of shock wave unsteadiness in shock wave boundary layer interaction”, Proc. International Symposium On Turbulence and Shear Flow Phenomena. Poitiers, France
- August 2012 **L. Agostini**, **L. Larchevêque** , **P. Dupont**, “Inviscid quasistatic modeling for unsteady shock reflection with separation”, Proc. 23rd International Congress of Theoretical and Applied Mechanics. Peking, China
- January 2011 **L. Agostini**, **L. Larchevêque** , **P. Dupont**, **J-F Debiève** et **J.-P. Dussauge**, “Zones of Influence and Shock Motion in a Shock Boundary Layer Interaction ”, Proc. 49th AIAA Aerospace Sciences Meeting. Orlando, USA
- June 2010 **L. Agostini**, **L. Larchevêque** , **P. Dupont** et **J.-P. Dussauge**, “Numerical study of a shock-turbulent boundary layer interaction with incipient separation”, Proc. 8th International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements. Marseille, France
- March 2010 **L. Agostini**, **L. Larchevêque**, **P. Dupont** et **J.-P. Dussauge**, “Numerical study of shock-turbulent boundary layer interaction with incipient and complete separation”, Proc. 45th Symposium on Applied Aerodynamics. Marseille, France
- September 2009 **F. Moisy**, **L. Agostini**, **G. Tan**, “Structure functions and energy transfers in a decaying rotating turbulence experiment”, Proc. 12th Euromech European Turbulence Conference. Marburg, Germany

August **L. Agostini**, L. Larchevêque , P. Dupont and J.-P. Dussauge, “Three-dimensional separation
2009 *in shock/boundary layer interaction*”, Proc. colloque Euromech LESTAC, Congrès Français
de Mécanique.
Marseille, France

July 2009 **L. Agostini**, L. Larchevêque , E. Garnier et E. De Martel, “Numerical study of three-
dimensional modulations in a shock-induced separation”, Proc. 3rd European Conference for
Aerospace Sciences.
Versailles, France

All these contributions were oral presentations, they were made by the author whose name is underlined.