CR HDR. Lionel Agostini

✉ lionel.agostini@univ-poitiers.fr
Publons: P-6967-2019
ORCID: 0000-0001-8305-5493
SCOPUS: 5501556
Google scholar
github.com/LionelAgo

Current employment

Since 2020 **Researcher - CNRS**
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 $\mathrm{Re}_\tau = 4200$ 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. Touber, 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. Touber, 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. Waindim, **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. Larchêveque** & **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 2009 **L. Agostini, L. Larchevêque , P. Dupont and J.-P. Dussauge**, *"Three-dimensional separation 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.