

# Georgios Rigas

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## EXPERIENCE

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Sep 2019–present **Imperial College London, Department of Aeronautics**  
LECTURER in Aerodynamics

2016-2019 **Caltech, Mechanical & Civil Engineering**  
SENIOR POSTDOCTORAL SCHOLAR  
Research advisor: Prof. Tim Colonius

2015-2016 **University of Cambridge, Department of Engineering**  
POSTDOCTORAL RESEARCH ASSOCIATE  
Research advisor: Prof. Matthew Juniper

## EDUCATION

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2010–2014 **Ph.D. in Aeronautical Engineering, Imperial College London**  
Thesis: Modelling and control of turbulent wake flows.  
Research advisors: Prof. Aimee S. Morgans, Prof. Jonathan F. Morrison

2005–2010 **Diploma in Mechanical Engineering, National Technical University of Athens**  
Thesis: Simulation and low-budget optimization of the active control of flows around airfoils.  
Research advisor: Prof. Kyriakos C. Giannakoglou

## ADDITIONAL EXPERIENCE

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2018 Visiting Researcher, NASA Langley (Hosts: Meelan Choudhari, Pedro Paredes)

2016 Visiting Research Scholar, Center for Turbulence Research Summer Program, Stanford

2015 Visiting Research Scholar, ONERA DAFE, Paris (Host: Denis Sipp)

2011–2013 Teaching Assistant, Imperial College London

2009 Intern, Hellenic Aerospace Industry, Athens

## AWARDS

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- Summer Program Fellowship, Stanford University, Center for Turbulence Research, 2016
- Osborne Reynolds Award (among the 6 best PhDs in UK in Fluid Mech.), ERCOFTAC, 2014
- Teaching Assistant of the Year Award, Imperial College London, Department of Aeronautics, 2013
- Graphical System Design Achievement Award, Finalist, National Instruments, 2012

## JOURNAL PUBLICATIONS

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10. A. Towne, G. Rigas, and T. Colonius. A critical assessment of the parabolized stability equations. *Theoretical and Computational Fluid Dynamics*, 33:359–382, 2019. doi:10.1007/s00162-019-00498-8.
9. O. T. Schmidt, A. Towne, G. Rigas, T. Colonius, and G. A. Brès. Spectral analysis of jet turbulence. *Journal of Fluid Mechanics*, 855:953–982, 2018. doi:10.1017/jfm.2018.675.
8. G. Rigas, A. S. Morgans, and J. F. Morrison. Weakly nonlinear modelling of a forced turbulent axisymmetric wake. *Journal of Fluid Mechanics*, 814:570–591, 2017. doi:10.1017/jfm.2017.32.
7. N. P. Jamieson and G. Rigas and M. P. Juniper. Experimental sensitivity analysis via a secondary heat source in an oscillating thermoacoustic system. *Int. J. Spray Comb. Dyn.*, 9:230–240, 2017. doi:10.1177/1756827717696325.
6. A. Orchini, G. Rigas, and M. P. Juniper. Weakly nonlinear analysis of thermoacoustic bifurcations in a Rijke tube. *Journal of Fluid Mechanics*, 805:523–550, 2016. doi:10.1017/jfm.2016.585.
5. R. D. Brackston, J. M. Garcia de la Cruz, A. Wynn, G. Rigas, and J. F. Morrison. Stochastic modelling and feedback control of bistability in a turbulent bluff body wake. *Journal of Fluid Mechanics*, 802:726–749, 2016. doi:10.1017/jfm.2016.495.
4. G. Rigas, N. P. Jamieson, L. K. B. Li, and M. P. Juniper. Experimental sensitivity analysis and control of thermoacoustic systems. *Journal of Fluid Mechanics (Rapid Communication)*, 787 R1, 2016. doi:10.1017/jfm.2015.715.
3. G. Rigas, A. S. Morgans, R. D. Brackston, and J. F. Morrison. Diffusive dynamics and stochastic models of turbulent axisymmetric wakes. *Journal of Fluid Mechanics (Rapid Communication)*, 778 R2, 2015. doi:10.1017/jfm.2015.390.
2. A. R. Oxlade, J. F. Morrison, A. Qubain, and G. Rigas. High-frequency forcing of a turbulent axisymmetric wake. *Journal of Fluid Mechanics*, 770:305–318, 2015. doi:10.1017/jfm.2015.153.
1. G. Rigas, A. R. Oxlade, A. S. Morgans, and J. F. Morrison. Low-dimensional dynamics of a turbulent axisymmetric wake. *Journal of Fluid Mechanics (Rapid Communication)*, 755 R5, 2014. doi:10.1017/jfm.2014.449.

## PATENTS

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1. G. Rigas, R. D. Brackston, J. M. Garcia de la Cruz Lopez, J. F. Morrison, and A. Wynn. Adaptive Base-Flaps Under Variable Cross-Wind, filed Feb 07, 2018. PCT/GB2018/050348.
2. G. Rigas, R. D. Brackston, J. M. Garcia de la Cruz Lopez, J. F. Morrison, and A. Wynn. Drag reduction method, filed Oct 31, 2016, and issued May 4, 2017. WO Patent App. PCT/GB2016/053364. URL: <https://www.google.com/patents/WO2017072530A1>.

## PROFESSIONAL ACTIVITY

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Reviewer	Journal of Fluid Mechanics, Physical Review Letters, Physical Review Fluids, Journal of Computational Physics, Experiments in Fluids, Physics of Fluids, Journal of Heat and Fluid Flow, Journal of Fluids and Structures, Fluid Dynamics Research, Experimental Thermal and Fluid Science, Journal of Wind Engineering & Industrial Aerodynamics, AIAA Journal, AIAA Aviation proceedings
Panel member	French National Research Agency (ANR)
Session chair	AIAA SciTech Forum, Grapevine TX, 2017. Session: Flow Stability Analysis Wavepacketfest, Poitiers, 2019. Session: Supersonic flow with shocks IUTAM Transition, London, 2019. Session: Dynamical Systems I
Memberships	American Physical Society, American Institute of Aeronautics and Astronautics

10. G. Rigas, E. Pickering, O. T. Schmidt, P. A. Nogueira, A. V. Cavalieri, G. A. Brès, and T. Colonius. Streaks and coherent structures in jets from round and serrated nozzles. In *25th AIAA/CEAS Aeroacoustics Conference*, page 2597, 2019. doi:[10.2514/6.2019-2597](https://doi.org/10.2514/6.2019-2597).
9. E. Pickering, G. Rigas, D. Sipp, O. T. Schmidt, and T. Colonius. Eddy viscosity for resolvent-based jet noise models. In *25th AIAA/CEAS Aeroacoustics Conference*, page 2454, 2019. doi:[10.2514/6.2019-2454](https://doi.org/10.2514/6.2019-2454).
8. P. A. Nogueira, A. V. Cavalieri, O. T. Schmidt, P. Jordan, V. Jaunet, E. Pickering, G. Rigas, and T. Colonius. Resolvent-based analysis of streaks in turbulent jets. In *25th AIAA/CEAS Aeroacoustics Conference*, page 2569, 2019. doi:[10.2514/6.2019-2569](https://doi.org/10.2514/6.2019-2569).
7. G. Brès, S. T. Bose, M. Emory, Frank E. Ham, O. Schmidt, G. Rigas, and T. Colonius. Large-eddy simulations of co-annular turbulent jet using a Voronoi-based mesh generation framework. In *AIAA Aviation, Atlanta, USA*, 2018. doi:[10.2514/6.2018-3302](https://doi.org/10.2514/6.2018-3302).
6. G. Rigas, O. Schmidt, T. Colonius, and G. Brès. One Way Navier-Stokes and resolvent analysis for modeling coherent structures in a supersonic turbulent jet. In *AIAA Aviation, Denver, Colorado, USA*, 2017. doi:[10.2514/6.2017-4046](https://doi.org/10.2514/6.2017-4046).
5. G. Rigas, T. Colonius, and M. Beyar. Stability of wall-bounded flows using one-way spatial integration of Navier-Stokes. In *AIAA Scitech, Grapevine, Texas, USA*, 2017. doi:[10.2514/6.2017-1881](https://doi.org/10.2514/6.2017-1881).
4. G. Rigas, L. Esclapez, and L. Magri. Symmetry breaking in 3D wakes. In *Proceedings of the Summer Program*. Center for Turbulence Research, Stanford University, 2016. arXiv:[1703.07405](https://arxiv.org/abs/1703.07405).
3. P.J. Blonigan, P. Fernandez, S.M. Murman, Q. Wang, G. Rigas, and L. Magri. Towards a chaotic adjoint for LES. In *Proceedings of the Summer Program*. Center for Turbulence Research, Stanford University, 2016. arXiv:[1702.06809](https://arxiv.org/abs/1702.06809).
2. G. Rigas, A. S. Morgans, and J. F. Morrison. Stability and coherent structures in the wake of axisymmetric bluff bodies at high Reynolds numbers. In *Instability and Control of Massively Separated Flows, Fluid Mechanics and Its Applications*, volume 107, pages 143–148. Springer, 2015. doi:[10.1007/978-3-319-06260-0\\_21](https://doi.org/10.1007/978-3-319-06260-0_21).
1. A. R. Oxlade, J. F. Morrison, and G. Rigas. Open-loop control of a turbulent axisymmetric wake. In *Instability and Control of Massively Separated Flows, Fluid Mechanics and Its Applications*, volume 107, pages 137–142. Springer, 2015. doi:[10.1007/978-3-319-06260-0\\_20](https://doi.org/10.1007/978-3-319-06260-0_20).

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ABSTRACTS

22. G. Rigas, D. Sipp, and T. Colonius. The minimal seed for wall-bounded transition in the frequency domain. In *IUTAM transition 2019, London UK*, September 2019.
21. G. Rigas, D. Sipp, and T. Colonius. Nonlinear solutions for wall-bounded transition in the frequency domain. In *71th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Atlanta USA*, November 2018.
20. E. Pickering, O. Schmidt, G. Rigas, and T. Colonius. Resolvent analysis of a Mach 1.5 jet for noise source identification. In *71th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Atlanta USA*, November 2018.
19. E. Pickering, O. Schmidt, G. Rigas, and T. Colonius. Resolvent analysis for noise source identification. In *The Journal of the Acoustical Society of America 144(3):1706*, September 2018.
18. O. T. Schmidt, A. Towne, G. Rigas, T. Colonius, and G. A. Brès. Spectral analysis of jet turbulence and radiated sound. In *The Journal of the Acoustical Society of America 144(3):1673*, September 2018.

17. G. Rigas, O. Schmidt, T. Colonius, and M. Beyar. One-way Navier-Stokes equations: optimal disturbances. In *Euromech Colloquium 591: Three dimensional instability mechanisms in transitional and turbulent flows, Bari, Italy*, 2017.
16. L. Magri, G. Rigas, and L. Esclapez. Symmetry breaking in 3D bluff-body wakes. In *Euromech Colloquium 591: Three dimensional instability mechanisms in transitional and turbulent flows, Bari, Italy*, 2017.
15. T. Colonius, G. Rigas, A. Towne, and M. Beyar. One-way Navier-Stokes equations: global stability analysis via efficient spatial marching. In *Euromech Colloquium 591: Three dimensional instability mechanisms in transitional and turbulent flows, Bari, Italy*, 2017.
14. O. Schmidt, G. Rigas, and T. Colonius. Low-rank behavior of turbulent jets. In *Euromech Colloquium 591: Three dimensional instability mechanisms in transitional and turbulent flows, Bari, Italy*, 2017.
13. L. Magri, G. Rigas, L. Esclapez, and Q. Wang. Sensitivity of 3D bluff body wakes via shadowing method and covariant Lyapunov vectors analysis. In *SIAM Conference on Computational Science and Engineering, Atlanta, Georgia, USA*, March 2017.
12. M. P. Juniper, N. P. Jamieson, J. G. Aguilar, and G. Rigas. Combined experimental and adjoint-based sensitivity analysis in thermoacoustics. In *24th International Congress of Theoretical and Applied Mechanics, Montreal, Canada*, August 2016.
11. Q. Wang, G. Rigas, L. Magri, and L. Esclapez. Global and Lyapunov sensitivity analysis of 3D wakes: from laminar to chaotic regimes. In *69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Portland, USA*, November 2016.
10. G. Rigas, T. Colonius, A. Towne, and M. Beyar. One-way spatial integration of Navier-Stokes equations: stability of wall-bounded flows. In *69th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Portland, USA*, November 2016.
9. G. Rigas, O. Schmidt, and T. Colonius. One-way spatial integration of Navier-Stokes equations: application to jet flows. In *IUTAM Symposium and Euromech Colloquium on jet noise modeling and control, Paris, France*, 2016.
8. N. Jamieson, G. Rigas, and M. P. Juniper. Experimental Sensitivity Analysis as a Validation for Adjoint-Based Methods in the Control of Thermoacoustic Oscillations. In *International Symposium on Thermoacoustic Instabilities in Gas Turbines and Rocket Engines: Industry meets Academia, Munich, Germany*, 2016.
7. M. Juniper, N. Jamieson, L. Li, and G. Rigas. Experimental sensitivity analysis and control of thermoacoustic systems. In *68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Boston, USA*, 2015.
6. G. Rigas, D. Sipp, and M. P. Juniper. Global stability analysis of turbulent 3D wakes. In *68th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Boston, USA*, 2015.
5. G. Rigas, A. S. Morgans, R. D. Brackston, and J. F. Morrison. Diffusive dynamics and stochastic models of turbulent axisymmetric wakes. In *Global Flow Instability and Control Symposium VI, Crete, Greece*, 2015.
4. G. Rigas, A. S. Morgans, and J. F. Morrison. Symmetries, multistability and stochastic dynamics of turbulent wakes. In *67th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, San Francisco, USA*, 2014.
3. G. Rigas, A. S. Morgans, and J. F. Morrison. Dynamic modeling of a turbulent axisymmetric bluff-body wake. In *66th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, Pittsburgh, USA*, 2013.
2. G. Rigas, A. S. Morgans, and J. F. Morrison. Model-based framework for feedback control in the wake of axisymmetric bluff bodies. In *10th ERCOFTAC SIG33 Workshop: Progress in Transition Modeling and Control, Sweden*, 2013.

1. G. Rigas, A. S. Morgans, and J. F. Morrison. The response of the wake past a bullet-shaped body to axisymmetric ZNMF forcing at high Reynolds numbers. In *65th Annual Meeting of the American Physical Society's Division of Fluid Dynamics, San Diego, USA*, 2012.

#### INVITED TALKS

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10. One-Way Navier Stokes equations: 3D hydrodynamic stability analysis via efficient spatial marching. Boeing, December 2018.
9. Physics-based data-informed models for controlling three-dimensional turbulent flows. Aeronautics & Astronautics, Stanford, October 2018.
8. Efficient modeling and control of three-dimensional turbulent flows using hydrodynamic stability. GALCIT Colloquium, California Institute of Technology, May 2018.
7. Towards a Unified Strategy to Control Three-dimensional Bluff Body Wakes. French Embassy, London, May 2016.
6. Stochastic modelling of turbulent wakes. MCE, California Institute of Technology, November 2015.
5. Low-dimensional dynamics and control of turbulent bluff body wakes. ENSTA, ParisTech, 2015.
4. Low-dimensional dynamics and control of turbulent bluff body wakes. The French Aerospace Lab, ONERA DAFE, 2015.
3. Low-dimensional dynamics and control of turbulent bluff body wakes. Dept. Engineering, University of Cambridge, 2015.
2. Symmetries and stochastic dynamics of turbulent wakes. Dept. Aeronautics, Imperial College London, 2014.
1. Symmetries and stochastic dynamics of turbulent wakes. 12th ERCOFTAC Osborne Reynolds Research Students Award, University College London, 2014.

#### WORKSHOPS

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2. 21st CISM/IUTAM International Summer School on Measurement, Analysis, and Passive Control of Thermoacoustic Oscillations, June 2015, Udine, Italy
1. Advanced Instability Methods Graduate School, August 2011, Cambridge, UK

#### PUBLIC ENGAGEMENT

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1. Smart wing design: Science Imitating Nature. Summer Science Exhibition, 1-6 July 2014 Royal Society, London. <http://sse.royalsociety.org/2014/smart-wing-design/>

September 2019