

Jonathan Finlay Morrison

Curriculum Vitae

Current appointments: Professor of Experimental Fluid Mechanics
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Education

DURHAM UNIVERSITY

B.Sc. (Hons) Engineering Science, 1977.

Ph.D. "A Study of an Axisymmetric Wall Jet with Streamline Curvature and its Application to the Coanda Flare", 1982. Supervisor Dr. DG Gregory-Smith.

Current & Previous Academic Appointments

- Head of Aerodynamics (June 2008 – July 2017)
- Professor of Experimental Fluid Mechanics, October, 2005.
- Director of Post-Graduate Studies (Ph.D.) and member of Management Committee of Graduate School for Engineering and Physical Sciences (2003 – 2004 & 2005 – 2009).
- Chair of Departmental Teaching Committee and Member of Faculty Teaching Committee (Jan 2005 – Feb 2006).
- Reader in Experimental Fluid Mechanics (2001 – 2005), Department of Aeronautics, Imperial College.
- Senior Lecturer (1996) & Lecturer (September 1991), Department of Aeronautics, Imperial College.
- Senior Tutor (1993 – 99): responsible for the provision of pastoral care and the maintenance of discipline within the undergraduate population.
- Temporary Lecturer, Department of Aeronautics, Imperial College. (Sept 1985 – Aug 1986). Undergraduate teaching (two lecture courses) and tuition. Some postgraduate supervision.
- Research Assistant, Department of Aeronautics, Imperial College. (July 1981 – Aug 1985). US Army contract, "Bursts and pressure fluctuations in turbulent boundary layers". Principal Investigator: P. Bradshaw.

Previous Industrial Appointments

GEC ALSTHOM Turbine Generators Ltd. (latterly ALSTOM) Trafford Park, Manchester. Senior Development Engineer, (Oct 1986 – Aug 1991).

External Activities

- Director of National Wind Tunnel Facility (January 2014 –)
- Member of *Aircraft of the Future* Specialist Advisory Group, ATI, (May 2017 – Dec 2019)
- Member of Aerodynamics Specialist Advisory Group, ATI, (January 2014 – March 2017)
- EPSRC Roadmap: Provision of Internationally Leading Wind Tunnel Infrastructure (2015)
- External Examiner, University of Cambridge, Engineering Tripos Part IB, Department of Engineering (September 2020 –)

November 19, 2021

- External Assessor, ETH, Department of Mechanical and Process Engineering, recruitment of Professorship in Fluid Dynamics (July 2014 - March 2017).
- External Examiner, University of Oxford, MEng Engineering Science (2014-16)
- External Examiner, University of Nottingham, MSc in Mechanical Engineering (2013-17)
- Member of National Technical Committee for aerodynamics, UK Department of Business, Innovation & Skills (October 2012-15)
- External Examiner: University of Durham, School of Engineering, M.Eng. & B.Eng. (2009-12); Queen Mary University of London, School of Engineering (2010-12); University of Warwick, School of Engineering (2011-13).
- External Assessor, University of Durham, School of Engineering, for recruitment of Reader/Professor in Thermodynamics & Fluid Mechanics (July 2009).
- Referee for overseas professorial/tenure appointments (Technion, Haifa; Rensselaer Polytechnic Institute; Caltech (GALCIT); Syracuse University; Queen's University at Kingston; KTH Stockholm, KISR Kuwait.
- Organiser of Prenominated Session "Flow Control" ICTAM, Adelaide, Aug 24 – 29, 2008.
- Organiser of IUTAM Symposium GA.02-03 "Flow Control and MEMS", Imperial College, Sept 19 – 22, 2006.
- Ph.D. Examiner for both British and Overseas Universities.
- Reviewer of research proposals for Engineering & Physical Sciences Research Council (EPSRC), Natural & Environmental Research Council (NERC), the British Council, the Foundation for Polish Science, CSCS Swiss National Supercomputing Centre, Member EPSRC Peer Review College.
- Editorial Board, International Journal of Heat and Fluid Flow. Guest Editor of Experimental & Thermal Fluid Science. Reviewer for Journal of Fluid Mechanics, Journal of Fluids and Structures, Experiments in Fluids, International Journal of Heat and Mass Transfer, The Aeronautical Journal, European Journal of Mechanics B/Fluids, Imperial College Press, IOP, Journal of Micromechanics and Microengineering.

Awards and Fellowships

Royal Academy of Engineering. Engineering Foresight Award. 1999 – 2000.

Visiting Fellow, Department of Mechanical & Aerospace Engineering, Princeton University (Aug 1999 – Aug 2000, July – Sept 2001, July – Sept 2002, Aug – Sept 2004).

Fellow of Royal Aeronautical Society.

Invited Talks

Separation Control. Institute of Fluid Science, Tohoku University, November 14, 2019

National Wind Tunnel Facility, UK: Flow Control Research. JAXA, Chofu Aerospace Center, Tokyo, November 13, 2019.

National Wind Tunnel Facility, UK. The 4th Wind and Flow Platform Symposium. Akihabara, Tokyo. November 12, 2019.

9th IFAC International Symposium on Advances in Automotive Control. Orléans, France. June 23-27, 2019.

National Wind Tunnel Facility. National Wind Tunnel/Fluid Mechanics Consortium. Melbourne, April 11-12, 2019.

National Wind Tunnel Facility. Aircraft of the Future, Specialist Advisory Group, ATI. Feb 21, 2019.

IUTAM Symposium "Critical flow dynamics involving moving/deformable structures with design applications", Santorini 18-22 June 2018.

National Wind Tunnel Facility. ATI National Conference, Birmingham NEC Nov 29, 2017.

4th GDR Symposium – Flow Separation Control, PRISME Laboratory, Polytech Orléans, November 8, 2017. GDR is a French group of research laboratories (CNRS, many universities and ONERA).

Department of Engineering, University of Cambridge, April 28, 2017

Department of Mechanical Engineering & Aeronautics, City University March 24, 2017

UTIAS Summer School on Sustainable Aviation, May 16-17, 2016.
 Downing College, Cambridge, UKCRIC workshop March 18, 2016
 EPSRC Capital Strategy Workshop, July 16, 2015
 Dept. Mechanics, KTH Stockholm, Odqvist Laboratory. 1st Annual User Meeting, December 4, 2014
 Institute for Pure and Applied Mathematics, UCLA. Mathematics of Turbulence, Workshop IV: Turbulence in Engineering Applications November 17 - 21, 2014
 iTi VI (interdisciplinary Turbulence initiative), Bertinoro, Italy September 22 – 24, 2014
 Royal Society Summer Science Exhibition, June 29 - July 6, 2014
 Wall Turbulence: A Colloquium under the Midnight Sun, Trondheim, Norway, June 23 – 24, 2014
 Extreme Flows Workshop in honour of the contributions of Lex Smits in the field of fluid dynamics. Princeton University, May 16-18, 2014
 ERCOFTAC Flow Control Course, UK Aerodynamics Centre, December 9-10, 2013
 Dept. Mechanics, KTH Stockholm, April 4, 2013.
 Dept. Ingenieria Mecanica y Mecanica De Fluidos, Universidad De Malaga, February 13-16, 2012
 Centro Andaluz De Medio Ambiente, University of Granada, February 15, 2012
 Embraer, Unidade São José Dos Campos, Brazil, October 26, 2011
 Institute of Aeronautical and Space (IAE/DCTA), São José Dos Campos, Brazil, October 25, 2011
 Escola Politécnica da USP, Departamento de Engenharia Mecânica, Brazil, October 24, 2011
 University of Toronto Institute of Aerospace Studies (UTIAS), September 20, 2011
 Invited Session, 49th AIAA Aerospace Sciences Meeting, Orlando, January 4-7, 2011
 FLOW-NORDITA Workshop and Spring School on Turbulent Boundary Layers. KTH Royal Institute of Technology, Stockholm, April 6-30, 2010
 Summary of Meeting, Minnowbrook VI – Triennial Flow Control Workshop, Syracuse University, Aug 23-36, 2009
 Invited Session, 47th AIAA Aerospace Sciences Meeting, Orlando, January 5-8, 2009
 KATnet II Drag Reduction Workshop, Ascot, QinetiQ, October 14-16, 2008
 Wall-bounded Shear Flows: Transition and Turbulence. Isaac Newton Institute, University of Cambridge, Sept 8-12, 2008
 Institute Mathematical Sciences, Imperial College, seminar June 19, 2008
 University of Warwick, Fluid Dynamics Research Centre, seminar June 11, 2008
 Fifth International Workshop on Wall-Bounded Turbulent Flows, Baltimore June 1-3, 2008
 KATnet II Separation Control Workshop ONERA, April 1-3, 2008
 Caltech, GALCIT colloquium, March 6, 2008
 Aerodynamic Drag Prediction and Reduction: Capabilities and Future Requirements. Royal Aeronautical Society, October 24, 2007
 CICLoPE Workshop, Bertinoro, October 13-15, 2007
 WALLTURB Workshop, Viterbo, March 22-23, 2007

Research Grants and Contracts (past 5 years, PI unless otherwise stated)

National Wind Tunnel Facility – phase 2 (NWTF+). UKRI Full Infrastructure Fund, 2022. £48.3m (pending).
 National Wind Tunnel Facility. EPSRC, Imperial College, Impact Acceleration account, 01/10/20 – 30/09/21, £103,074.
 Understanding and exploiting non-equilibrium effects on turbulent boundary layers: Towards realisable drag reduction strategies (EPSRC EP/R032467/1) 1/10/18 – 30/09/22, £943,563.
 EPSRC, Imperial College, Impact Acceleration account, 01/04/16 – 31/03/17, £88,499
 Surface Travelling Waves for Skin Friction Drag Reduction, extension to EADS-IW202838, 01/10/15 to 30/09/16, £30k
 Transpiration Cooling Systems for Jet Engine Turbines and Hypersonic Flight (PI Ireland, EPSRC, EP/P000878) 4 institutions, 18/08/16 – 17/08/22, £6.1m
 National Wind Tunnel Facility (EPSRC, EP/L024888) 7 institutions, 01/01/14 – 31/12/19, £13.3m
 Jet-Pulse Technology for Vehicle Drag Reduction (EPSRC, Imperial College, Impact Acceleration account) 01/04/13 – 31/03/14, £105,000

Truck Drag Reduction Using Air Pulsation System (Climate-KIC Incubation Programme) 01/10/12 – 31/03/2013 & 27/4/2015 – 30/10/2015, €45k
 TS Wave Cancellation, EADS-IW203591 01/10/12 – 30/09/15, £90k
 Surface Travelling Waves for Skin Friction Drag Reduction, EADS-IW202838 01/10/12 – 30/09/15, £135k
 HGV Drag Reduction Using Air Pulse Technology, Imperial Innovations 01/09/11 – 29/02/12, £25k
 Modelling and Control of Bridge Deck Oscillation, Mott MacDonald 01/10/10 – 30/09/15, £40k
 Scale Interactions in Wall Turbulence: Old Challenges Tackled with New Perspectives (EP/I037938) 10/07/12 – 9/07/15, £412,679
 LFC-UK: Development of Underpinning Technology for Laminar Flow Control (PI: Hall, EPSRC, EP/I037946) 10/03/11 – 09/03/16, £4.2M
 Bluff-body drag reduction using feedback control (EPSRC, EP/I005684) 01/11/10 – 31/10/13, £589,070
 EPSRC/Airbus “Active Aircraft” programme: Flow Control with Ink-jet Printed Polymer Surfaces (EP/F004435) 4/02/08 – 3/06/09, £181,824
 A Systems-Theory Approach to Flow Control (PI: Limebeer, EPSRC, EP/E017304/1) 29/10/06 – 28/10/09, £273,132
 Turbulent flows Over Rough Walls (EPSRC, EP/D037166) 01/02/06 – 31/01/09, £260,441
 Elastomer Surface Pressure Sensor and its Integration to a ‘Smart’ surface for Active Flow Control (EPSRC, EP/C535847) 15/01/06 – 14/01/11, £779,534
 Active Control of Separation with Pulsed Jets. Ferrari S.p.A. 01/12/06 – 30/11/09, £147,049
 Drag Reduction Using Spanwise Travelling Waves. Airbus CASE, 19/07/04 – 18/07/07, £74,700
 Drag Reduction Using Spanwise Travelling Waves. QinetiQ CASE, 1/10/05 – 30/09/08, £79,285
 Turbulence Platform Grant (PI: Vassilicos, EPSRC, GR/S82947, 7 investigators, with Southampton) 19/7/04 – 18/7/09, £395,873
 UK Turbulence Consortium (PI: Coleman, EPSRC, EP/D044073, 15 investigators, multi-institutional) 08/03/06 – 07/03/09, £71,928

Recent Journal Papers

Zhu T and Morrison JF, 2021, Simulation of a turbulent axisymmetric bluff body wake with pulsed jet forcing, *Physical Review Fluids*, to appear.
 Diwan SS and Morrison JF, 2021, Intermediate scaling and logarithmic invariance in turbulent pipe flow, *Journal of Fluid Mechanics (Rapids)*, Vol: 913, Pages: R1-12.
 Garland MGC, Santer MS, Morrison JF, 2019, Control of cellular separation using adaptive surfaces, *Journal of Fluids and Structures*, Vol: 91, ISSN: 0889-9746
 Brackston RD, Wynn A, Morrison JF, 2018, Modelling and feedback control of vortex shedding for drag reduction of a turbulent bluff body wake, *International Journal of Heat and Fluid Flow*, Vol: 71, Pages: 127-136, ISSN: 0142-727X
 Bird J, Santer M, Morrison J, 2018, Compliant kagome lattice structures for generating in-plane waveforms, *International Journal of Solids and Structures*, Vol: 141-142, Pages: 86-101, ISSN: 0020-7683
 Bird J, Santer M, Morrison J, 2018, Experimental control of turbulent boundary layers with in-plane travelling waves, *Flow, Turbulence and Combustion*, Vol: 100, Pages: 1015-1035, ISSN: 1386-6184
 Vemuri H, Bosworth R, Morrison JF, Kerrigan EC, 2018, Real-time feedback control of 3D Tollmien-Schlichting waves using a dual-slot actuator geometry, *Physical Review Fluids*, Vol: 3, ISSN: 2469-990X
 García de la Cruz JM, Oxlade AR and Morrison JF, 2017 Passive control of base pressure on an axisymmetric blunt body using a perimetric slit, *Phys. Review Fluids*. 2, 043905, 2017 DOI: 10.1103/PhysRevFluids.2.043905
 Garland M, Santer M, Morrison JF, Optimal Aero-Structural Design of an Adaptive Surface for Boundary Layer Motivation Using an Auxetic Lattice Skin, 2017, *Journal of Intelligent Material Systems and Structures*, ISSN: 1530-8138
 Bird J, Santer M, Morrison JF, 2017, The determination and enhancement of compliant modes for actuation in structural assemblies, *International Journal of Solids and Structures*, Vol: 106, Pages:

264-273.

- Rigas G, Morgans AS, Morrison JF, 2017, Weakly nonlinear modelling of a forced turbulent axisymmetric wake, *Journal of Fluid Mechanics*, Vol: 814, Pages: 570-591, ISSN: 0022-1120
- Brackston RD, Wynn A, Morrison JF, 2016, Extremum seeking to control the amplitude and frequency of a pulsed jet for bluff body drag reduction, *Experiments in Fluids*, Vol: 57, ISSN: 0723-4864
- Brackston RD, de la Cruz JMG, Wynn A, Rigas G, Morrison JF, 2016, Stochastic modelling and feedback control of bistability in a turbulent bluff body wake, *Journal of Fluid Mechanics*, Vol: 802, Pages: 726-749, ISSN: 0022-1120
- Hultmark M, Marusic I, McKeon BJ, Morrison JF, 2016, Introduction to Topical Issue on Extreme Flows, *Experiments in Fluids*, Vol: 57, ISSN: 0723-4864
- Morrison JF, Vallikivi M, Smits AJ, 2016, The inertial subrange in turbulent pipe flow: centreline, *Journal of Fluid Mechanics*, Vol: 788, Pages: 602-613, ISSN: 0022-1120
- Rigas G, Morgans AS, Brackston RD, Morrison JF, 2015, Diffusive dynamics and stochastic models of turbulent axisymmetric wakes. *Journal of Fluid Mechanics*, Vol: 778, R2
- Oxlade AR, Morrison JF, Qubain A, Rigas G, 2015, High-frequency forcing of a turbulent axisymmetric wake. *Journal of Fluid Mechanics*, 2015, Vol: 770, Pages: 305-318
- Jones BLI., Heins PH, Kerrigan EC, Morrison JF and Sharma AS, 2015, Modelling for robust feedback control of fluid flows. *Journal of Fluid Mechanics* 2015, Vol: 769, Pages: 687-722
- Rigas G, Oxlade AR, Morgans AS, Morrison JF, 2014, Low-dimensional dynamics of a turbulent axisymmetric wake. *Journal of Fluid Mechanics*, Vol: 755, R5
- Morrison JF, MEMS devices for active drag reduction in aerospace applications, 2013, *MEMS for automotive and aerospace applications*. Eds. Michael Kraft & Neil M White. Woodhead Publishing Series in Electronic and Optical Materials: Number 32, pp.153-176
- Gouder K, Potter M, Morrison JF, 2013, Turbulent friction drag reduction using electroactive polymer (EAP) and electromagnetically-driven surfaces. *Experiments in Fluids*, 2013, 54:1441
- Oxlade AR, Valente PC, Ganapathisubramani B, Morrison JF, 2012, Denoising of time resolved PIV for accurate measurement of turbulence spectra and reduced error in derivatives. *Experiments in Fluids*, 53:1561-1575
- Birch DM, Morrison JF, 2012, An innovative low-profile monolithic constant-temperature anemometer, *Journal of Wind Engineering and Industrial Aerodynamics*. Vol:100, 38-45
- Birch DM, Morrison JF, 2011, Similarity of the streamwise velocity component in very-rough-wall channel flow. *Journal of Fluid Mechanics*, Vol:668, Pages:174-201
- Potter M, Gouder K, Morrison JF, 2011, A numerical model for electro-active polymer actuators with experimental validation. *Sensors and Actuators A-Physical*, 2011, Vol:170, Pages:121-130
- Jones BL, Kerrigan EC, Morrison JF, Zaki TA, 2011, Flow estimation of boundary layers using DNS-based wall shear information. *Internal Journal of Control*, Vol:84, Pages:1310-1325
- Sharma AS, Morrison JF, McKeon BJ, Limebeer DJN, Koberg WH, Sherwin SJ, Relaminarisation of $Re=100$ channel flow with globally stabilising linear feedback control. *Physics of Fluids*, 2011, Vol:23, Pages:125105-1-125105-17
- Morrison, JF 2010, Turbulent boundary layers. *Encyclopedia of Aerospace Engineering*. Eds. Richard Blockley & Wei Shyy. John Wiley & Sons Ltd.
- Hanson RE, Lavoie P, Naguib AM, Morrison JF, 2010, Transient growth instability cancelation by a plasma actuator array. *Experiments in Fluids*, Vol:49, Pages:1339-1348
- Dearing SS, Morrison JF, Iannucci L, 2010, Electro-active polymer (EAP) "dimple" actuators for flow control: Design and characterisation. *Sensors and Actuators A-Physical*, Vol:157, Pages:210-218
- Naguib AM, Morrison JF, Zaki TA, 2010 On the relationship between the wall-shear stress and transient-growth disturbances in a laminar boundary layer. *Physics of Fluids*, Vol:22, Pages:054103-1-054103-13
- McKeon BJ, Morrison JF, 2007, Asymptotic scaling in turbulent pipe flow. *Phil. Trans. Royal Society A-Mathematical Physical and Engineering Sciences*, Vol:365, Pages:771-787
- Morrison JF, 2007, The interaction between inner and outer regions of turbulent wall-bounded flow. *Phil. Trans. Royal Society A-Mathematical Physical and Engineering Sciences*, Vol:365, Pages:683-698
- Dearing SS, Lambert S, Morrison JF, 2007, Flow control with active dimples. *The Aeronautical Journal*, Vol:111, Pages:705-714

Patents

G. Rigas, R. D. Brackston, J. M. Garcia de la Cruz Lopez, J. F. Morrison, and A. Wynn. Drag Reduction Method. GB Patent Application Number 1519156.2, filed October 29, 2015.

Morrison JF, Oxlade AR and Garcia de la Cruz Lopez, Passive Drag Reduction Apparatus. GB Patent Application number, GB1510497.9, filed June 16, 2015.

Morrison JF, Qubain A, Oxlade AR and Garcia de la Cruz Lopez, A Vehicle Comprising at Least One Apparatus for Reducing Drag on the Vehicle, No. 1213451.6, 27 July 27, 2012.

International (PCT) Application No: PCT: [WO 2014016618](#); National: [EP 2877390](#); National [US 20150210323](#)

Morrison JF, Dearing SS, Arthur GG, McKeon BJ, and Cui Z, Fluid flow control using boundary layer control, UK, WO2006040532, 2006