

Curriculum Vitae: Adrian Philip Gaylard

Summary

I am a career ground vehicle aerodynamicist with a background in physics and maths, who has specialised in the application of Computational Fluid Dynamics to solve automotive aerodynamics problems, but has developed a broad interest in the field which extends to experimental methods and the vehicle development process.

I am a keen supporter of research and development activities, leading substantial grant-funded projects, postdoctoral research, and doctoral programmes; as well as supporting Masters Thesis projects.

My current research interests include: vehicle drag reduction, surface contamination, unsteady aerodynamics, cooling systems optimisation and the role of CFD in the automotive design process.

I have published more than 30 conference and journal papers, as well as a book chapter. I am the Chair of the Aerodynamics activity at the SAE and a member of the European Car Aerodynamics Research Association (ECARA).

I am both a Chartered Engineer and Chartered Physicist.

Current Role & Responsibilities

I am the Aerodynamics Technical Specialist at Jaguar Land Rover (JLR). This means that I am the senior technical authority for aerodynamics; responsible for all test and simulation methods. I provide training, coaching and technical supervision for the Aerodynamics Team. I also lead methods development and research activities for the *aerodynamics* and water & soiling management (*surface contamination*) disciplines.

As part of my research role I identify new projects, secure internal funding, and work collaboratively with Universities and other suppliers to see that they are carried out. My main current research programmes are:

- JLR/EPSCRC “Programme for Simulation Innovation.” This is a £10M five-year programme of collaborative research. I am JLR’s lead for the “Multi-physics and multi-functional simulation” theme, which is placed at Loughborough University. This includes projects in reduced order modelling, structural mechanics, combustion, aerodynamics, surface contamination, terra-mechanics and vibro-acoustics. I am personally leading the *aerodynamics* and *surface contamination* projects; I am also the Industrial Supervisor for three PhD students engaged in these projects.
- *Postdoctoral Research in Vehicle Drag Reduction*. I am supervising a two-year programme of research at Loughborough University.
- *Holistic Cooling Systems Optimisation*. I am supervising a PhD programme at Cranfield University on optimising cooling systems for aerodynamic drag, cooling performance and cost.
- *Unsteady flow, Vehicle Surface Contamination and Aerodynamic Drag*. I am personally undertaking a research project with Warwick University (WMG) on this topic as part of an Engineering Doctorate programme.

I also supervise the work of students doing Masters and Doctoral Thesis work, both at Universities and placed within JLR.

Other Roles

I support a wide range of initiatives and activities within the automotive aerodynamics community. These include:

- Chair of the Aerodynamics activity at the SAE;
- Member of the Advisory Board for the EPSRC funded (UK) National Wind Tunnel Facility;

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- Member Steering & Impact Committee meeting for the EPSRC Research Programme "Micro and Nano Flows for Engineering;"
- Member of the European Car Aerodynamics Research Association (ECARA);
- Chair for the 2014 I. Mech. E. International vehicle aerodynamics conference;
- Industrial Advisory Panel member for MSc courses at Cranfield University (Aerospace Dynamics & CFD) and Imperial College (Aeronautical Engineering);
- Chartered Engineer and Chartered Physicist panel member at the Institute of Physics;
- Accredited examiner for postgraduate research degrees at Cranfield and Strathclyde Universities.

Professional History

A summary of my career is shown below, with key achievements noted.

Jaguar Land Rover

Technical Specialist – Aerodynamics & CFD, Jaguar Land Rover (6/2006 to present)

- See “Current Role & Responsibilities”

Principal Engineer – CFD, Aerodynamics, Jaguar Land Rover (8/2001 to 6/2006)

- Developed and deployed CFD simulation technique for wind noise (aeroacoustics).
- Responsible for the introduction of CFD simulation into the Land Rover product development process.

MIRA Ltd, (04/96 to 08/2001)

Principal Engineer, Aerodynamics and CFD, MIRA (01/99 to 08/01)

- Lead MIRA's external aerodynamics consultancy team as both the technical expert and line manager.
- Project Manager and Technical Authority for the UK government funded "Truck Aerodynamic Styling" Best Practise Guide (See ETSU, 2001).
- MIRA's Lead Researcher and project manager for the EPSRC supported project: "Investigation of the slipstreams and wakes of ground vehicles." (See Baker *et al.*, 2000)
- Undertook wind-tunnel based aerodynamics development projects for companies including Bentley, Hyundai, Prodrive, Daewoo, and Iran Khodra.
- Completed CFD-based aerodynamics development projects for companies including Bentley, Aston Martin and Spectre.
- Lead cooling airflow development work for companies including TWR and Iran Khodra.
- Provided wind-tunnel training course for Hyundai Aerodynamics Department
- Methods development projects for companies including Renault and PSA.
- External examiner for a Ph.D. at Durham University (Simms-Williams, 2001.)

Higher Project Engineer (01/01/97 to 01/01/99)

- Supported Speedo's search for low drag fabrics for competition swimwear via wind tunnel methods development and technical consultancy.
- MIRA's Lead Researcher and project manager of the BRITE-EURAM III project "Railway Aerodynamics for Passing and Interactions with Dynamic Effects" (See Matschke *et al.*, 1999).
- Advised ADTRANZ on the location and resulting pressure gradient acting on externally mounted air intakes for a new rail vehicle design.

Project Engineer (10/04/96 to 01/01/97)

- Undertook research work for Rover Group Ltd on CFD simulation accuracy for aerodynamics.
- Completed consultancy projects on CFD simulation of smoke spread in railway tunnels and stations.

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British Rail Research (09/87 to 04/96)

Principal Scientific Officer, Aerodynamics Team, British Rail Research (12/95 to 04/96)

- Responsible for inter-disciplinary projects within the mechanical engineering discipline.
- Developed the technical data for a national railway Standard covering Aerodynamic Loads on trackside structures caused by train passing events.

Senior Scientific Officer, Aerodynamics Team (05/91 to 12/95)

- UK rail industry representative on European Railway Research Institute (ERRI) committee C206.2 (Aerodynamic Loads on Freight Vehicles)
- Supporting CFD analysis for train drag reduction studies, leading to the elucidation of an undiscovered induced drag mechanism.

Scientific Officer, Aerodynamics Unit (06/89 to 05/91)

- First application of CFD in the railway industry to:
 - Load loss from open hopper wagons (See Gaylard, 1993).
 - Snow ingestion into train traction motors.
 - Temperature rise inside a closed rail vehicle due to occupant metabolic load (see Gaylard, 1993.)
 - Flow over the roof of a power car at yaw (See Gaylard & Johnson, 1992.)
- Re-design of the Mark IV Carriage connection external profile based on CFD analysis.

Research Officer, Graduate Training Scheme (09/87 to 05/89)

- Applied both CFD and experiments (reduced scale and small scale rigs) to the design of the Channel Tunnel Pressure Relief Ducts

Education

2012 – Engineering Doctorate (International), The University of Warwick

1983 – 1987 BSc (Hons) Physics with Mathematical Sciences, Leicester Polytechnic.

- Institute of Physics Corporate Membership, MInstP. (1993)
- Chartered Engineer, CEng (1999)
- Chartered Physicist, CPhys (1993)

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Publications

Journal Papers

- Gaylard, A., Oettle, N., Gargoloff, J., and Duncan, B. (2014). Evaluation of Non-Uniform Upstream Flow Effects on Vehicle Aerodynamics. *SAE Int. J. Passeng. Cars - Mech. Syst.*, **7**(2):692-702.
- Koitrand, S., Lofdahl, L., Rehnberg, S., and Gaylard, A. (2014). A Computational Investigation of Ground Simulation for a Saloon Car. *SAE Int. J. Commer. Veh.*, **7**(1):111-123.
- Robertson, I., Becot, A., Gaylard, A., and Thornber, B. (2014). Automotive Drag Reduction through Distributed Base Roughness Elements. *Applied Mechanics and Materials*, **553**(3), 267-272.
- Gaylard, A., Pitman, J., Jilesen, J., Gagliardi, A. *et al.* (2014). Insights into Rear Surface Contamination Using Simulation of Road Spray and Aerodynamics. *SAE Int. J. Passeng. Cars - Mech. Syst.*, **7**(2):673-681.
- Jilesen, J., Gaylard, A., Duncan, B., Konstantinov, A., *et al.* (2013). Simulation of Rear and Body Side Vehicle Soiling by Road Sprays Using Transient Particle Tracking. *SAE Int. J. Passeng. Cars - Mech. Syst.*, **6**(1), pp. 424-435.
- Gaylard A. P., Fagg M, Bannister M, Duncan B, *et al.* (2012). Modelling A-Pillar Water Overflow: Developing CFD and Experimental Methods. *The SAE International Journal of Passenger Cars - Mechanical Systems*, **5**(2), 789-800.
- Gaylard, A. and Duncan, B., (2011). Simulation of Rear Glass and Body Side Vehicle Soiling by Road Sprays. *SAE Int. J. Passeng. Cars – Mech. Syst.* **4**(1), 184-196.
- Gaylard, A., Beckett, M., Gargoloff, J., and Duncan, B., (2010). CFD-based Modelling of Flow Conditions Capable of Inducing Hood Flutter. *SAE Int. J. Passeng. Cars - Mech. Syst.*, **3**(1):675-694.
- Ahmad, N., Abo-Serie, E., & Gaylard, A. (2010). Mesh Optimization for Ground Vehicle Aerodynamics. [Online]. (URL <http://www.issres.net/journal/index.php/cfdl/article/view/63/43>) *CFD Letters*, **2**(1). (Accessed 9 August 2010).
- Gaylard A. P., Howell, J. P. & Garry, K. (2007). Observation of Flow Asymmetry Over the Rear of Notchback Vehicles. *SAE 2007 Transactions Journal of Passenger Cars: Mechanical Systems*, 2007-01-0900.
- Gaylard A. P. (2006). CFD Simulation of Side Glass Surface Noise Spectra for a Bluff SUV. *SAE 2006 Transactions Journal of Passenger Cars: Mechanical Systems*, 2006-01-0137, SP-1991.
- Prevezer, T., Holding, J., Gaylard, A. & Palin, R. (2002). Bluff body asymmetric flow phenomenon - real effect or solver artefact? *Wind and Structures*, **5**(2-4), 359-368.
- Gaylard A. P. (1993). The application of Computational Fluid Dynamics to railway aerodynamics. *Journal of Rail and Rapid Transit, Part F, Proceedings of the Institution of Mechanical Engineers*, **207**, 133-141.

Book Chapter

- Gaylard A. P. (2001). A Comparison of a Conventional RANS and a Lattice Gas Dynamics Simulation - A Case Study in High Speed Rail Aerodynamics. *In: Rhodes N. ed. Computational Fluid Dynamics in Practice*. London: Professional Engineering Publishing Ltd, Ch. 3.

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Peer-Reviewed Conference Papers

Abo-Serie, E., Sherif, M., Pompei, D., and Gaylard, A., (2014) CFD Simulation of External Distribution of Tail-Pipe Emissions Around a Stationary Vehicle Under Light Tail-Wind Conditions. SAE Technical Paper 2014-01-0586. Paper presented at *SAE 2014 World Congress & Exhibition*, April 2014. Warrendale: SAE International.

Oettle N., Mankowski O., Sims-Williams D., Dominy R., Freeman C., Gaylard A. P. (2012). Assessment of a Vehicle's Transient Aerodynamic Response. SAE Technical Paper 2012-01-0449. Paper presented at *SAE 2012 World Congress & Exhibition*, April 2012. Warrendale: SAE International.

Freeman C. M., & Gaylard A. P. (2010). Correlation of CFD Simulation for Front Side Glass Wall Pressure Fluctuations at Yaw. Paper presented at *8th MIRA International Conference on Vehicle Aerodynamics*, October 2010, Nuneaton: MIRA Ltd.

Samples M., Gaylard A. P., & Windsor S. (2010). The Aerodynamics Development of the Range Rover Evoque. Paper presented at *8th MIRA International Conference on Vehicle Aerodynamics*, October 2010, Nuneaton: MIRA Ltd.

Gaylard A. P., Lynch D., Amodeo J., & Amunugama R. (2010). The Simulation of Brake Dust Deposition. Paper presented at *8th MIRA International Conference on Vehicle Aerodynamics*, October 2010, Nuneaton: MIRA Ltd.

Irving Brown, Y. A., Windsor, S., and Gaylard, A. P. (2010). The Effect of Base Bleed and Rear Cavities on the Drag of an SUV. SAE Technical Paper 2010-01-0512. Paper presented at *SAE 2010 World Congress & Exhibition*, April 2010. Warrendale: SAE International.

Gaylard A. P. (2009) The Appropriate Use of CFD in the Automotive Design Process. SAE Technical Paper 2009-01-1162. Paper presented at *SAE 2009 International Congress and Exposition*, April 2009. Warrendale: SAE International.

Gaylard A. P. (2008). The Aerodynamic Development of the New Jaguar XF. Paper presented at *7th MIRA International Conference on Vehicle Aerodynamics*, October 2008, Nuneaton: MIRA Ltd.

Freeman C. M. & Gaylard A. P. (2008). Integrating CFD and Experiment: The Jaguar Land Rover Aeroacoustics Process. Paper presented at *7th MIRA International Conference on Vehicle Aerodynamics*, October 2008, Nuneaton: MIRA Ltd.

Gaylard A. P., Wilson A. C., & Bambrook G. S. J. (2006) A Quasi-Unsteady Description of Windscreen Wiper Induced Flow Structures. Paper presented at *6th MIRA International Vehicle Aerodynamics Conference*, October 2006, Nuneaton: MIRA Ltd.

Gaylard A. P. (2004). Simulation of A-Pillar/Side Glass Flows for Bluff SUV Geometries. Paper presented at *Fifth MIRA International Conference on Vehicle Aerodynamics*, October 2004, Nuneaton: MIRA Ltd.

Baker C. J., Dalley S., Johnson T., Brown M. A., Gaylard A. P., Quinn A., & Wright N. (2000). Measurements of the Slipstream and Wake of a Model Lorry. Paper presented at *Third MIRA International Conference on Vehicle Aerodynamics*, October 2000, Nuneaton: MIRA Ltd.

Palin R. B., Gaylard A. P. & Cook R. G. A. (2000). CFD Investigation of Unsteady Flow Features in and Around the Passenger Compartment of an Open-top Coupe. Paper presented at *Third MIRA International Vehicle Aerodynamics Conference*, October 2000, Nuneaton: MIRA Ltd.

Matschke G., Schulte-Werning B., Fauchier C., Gregoire R. & Gaylard A. P. (1999) Numerical simulation of the flow around a six-coach high speed train. Paper presented at *World Congress on Rail Research, WCRR '99*, October 1999, Tokyo.

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Gaylard A. P., Baxendale A. J. & Howell J. P. (1998). The use of CFD to predict the aerodynamic characteristics of simple automotive shapes. SAE Technical paper No. 980036. Paper presented at *SAE 1998 International Congress and Exposition*, February 1998. Warrendale: SAE International.

Gaylard A. P., Bickerton J. & Howell J. P. (1998) Current issues in the use of CFD to predict aerodynamic characteristics of car shapes. Paper presented at *Second MIRA International Conference on Vehicle Aerodynamics*, October 1998, Nuneaton: MIRA Ltd.

Khandhia Y, Gaylard A. P. & Johnson T. (1996). CFD Simulation of Three Dimensional Unsteady Train Aerodynamics. Paper presented at *First MIRA International Conference on Vehicle Aerodynamics*, October 1996, Nuneaton: MIRA Ltd.

Gaylard A. P., Howlett A. B. & Harrison D. J. (1994). Assessing drag reduction measures for high speed trains. Paper presented at *Vehicle Aerodynamics*, July 1994, London: The Royal Aeronautical Society.

Other Conference Papers

Alajbegovic, A., Gaylard, A., Duncan, B. & Gargoloff, J. (2014). Vehicle aerodynamic effects of realistic transient wind conditions. Paper presented at *11th World Congress on Computational Mechanics*, July 2014. Barcelona: International Centre for Numerical Methods in Engineering (CIMNE).

Gaylard A. P. & Johnson T. (1993). The practical application of CFD to railway aerodynamics. Paper C461/020. Paper presented at *Engineering Applications of Computational Fluid Dynamics*, September 1993. London: Mechanical Engineering Publications Ltd.

Published Reports

ETSU. (2001). *Truck Aerodynamic Styling*. Harwell: AEA Technology Environment. (GPG 308).

Gaylard, A. P. & Johnson, T. (1992). *CFD Investigation of train roof flows*. Utrecht: European Railway research Institute (ERRI). (C 179/DT 258)