

James Brind

Research Associate in Turbine Aeroacoustics, Whittle Laboratory

Bye-Fellow, Fitzwilliam College

✉ jb753@cam.ac.uk 🏠 jamesbrind.uk 📞 [jb753](tel:+44122333753)

Current position

2019 – present **Research Associate in Turbine Aeroacoustics**

Whittle Laboratory, University of Cambridge

- Quantifying reflections of sound waves from turbines using analytical models and time-marching computational fluid dynamics
- Mean-line and three-dimensional studies to explore the design space
- Implementing methods in software for use by industrial sponsor MHI

Education

2015 – 2019 **Ph.D. Gas Turbine Aerodynamics**

Whittle Laboratory, University of Cambridge, Corpus Christi College

Thesis title: “The Effect of Blade Row Interaction on Rotor Film Cooling”

Supervisor: Dr. Graham Pullan; sponsors: MHI and EPSRC

- Novel measurements showed that if film cooling responds non-linearly to unsteady flow, current rotor design methods are in error
- High-fidelity computations show non-linear cooling reduction of 30%
- New design guidelines and hierarchy of models for rotor film cooling

2014 – 2015 **M.Res. Gas Turbine Aerodynamics** – Pass with Distinction

Whittle Laboratory, University of Cambridge, Corpus Christi College

- Graduate-level lecture courses, practical coursework, industrial visits
- Placed second in cohort scoring 79% overall

2010 – 2014 **M.Eng. Mechanical Engineering** – Pass with Distinction

Department of Engineering, University of Cambridge, Peterhouse

- Achieved first-class results every year, ranking in top 10 percent

★ Sir Christopher Cockerell Scholarship in Engineering

★ Hugo de Balsham Prize for Exceptional Academic Distinction

Fourth-year project title: “Compressor bleed system design”

- Redesigned a compressor bleed slot using computations, manufactured new geometry, and measured 32% reduction in bleed system loss
- Wrote up into first-class dissertation, and contributed to a journal paper

Funding

2022 **Freeman Scholarship** – £5k for summer internship student

- Awarded from Whittle Laboratory Freeman Fund for innovative research
- Application of machine learning methods to database of literature measurements to produce an open-source film cooling design tool

Publications

- Brind, J.** “Acoustic boundary conditions for can-annular combustors”. *Under review for ETC15.*
- 2022 **Brind, J.** “The acoustic impedance of three-dimensional turbines”. *J. Sound Vib.*, doi : [10/jd4n](https://doi.org/10/jd4n); [preprint](#).
- 2021 **Brind, J., Pullan, G.** “Modelling Turbine Acoustic Impedance”. *Int. J. Turbomach. Propuls. Power*, doi : [10/gg4k](https://doi.org/10/gg4k); *Proc. ETC14.*
★ Winner of European Turbomachinery Society Best Paper Award
- 2020 **Brind, J., Pullan, G.** “Effect of Blade Row Interaction on Rotor Film Cooling”. *J. Turbomach.*, doi : [10/ggwm](https://doi.org/10/ggwm); *Proc. ASME GT2019*, doi : [10/ggwn](https://doi.org/10/ggwn).
★ Nominated for IGTI Heat Transfer Committee Best Paper Award
- 2020 Grimshaw, S.D., **Brind, J., Pullan, G., Seki, R.** “Loss in Axial Compressor Bleed Systems”. *J. Turbomach.*, doi : [10/ggww](https://doi.org/10/ggww); *Proc. ASME GT2019*, doi : [10/ggwr](https://doi.org/10/ggwr)

Presentations

- 2021 **15th European Turbomachinery Conference** *Gdansk, Poland (online)*
- 2019 **ASME Turbo Expo** *Charlotte, NC, USA*
- 2017 **Fluids, Energy and Turbomachinery Exposition** *University of Cambridge*
★ Awarded Best Presentation Prize
- 2015 – **MHI Turbomachinery Workshop** *Takasago, Japan*
- present Annual presentations to senior engineers from industry sponsor and international academic collaborators

Teaching

- 2020–
present **M.Eng. Fourth-year Project Supervision**
Department of Engineering, University of Cambridge
Proposing a project with educational and research value, guiding student at weekly meetings, providing feedback on presentations and reports
- “Open-source, data-driven turbomachinery design” (2022/23)
 - “Fans for direct air carbon capture”, co-supervised (2022/23)
 - “Effect of Unsteadiness on Film Cooling”, co-supervised (2021/22)
 - “Unsteady Fluid Dynamics of Film Cooling”, co-supervised (2020/21)
- 2019 –
present **Teaching Bye-Fellow**
Fitzwilliam College, University of Cambridge
Elected to a Fellowship on the basis of teaching excellence
- 2015 –
present **Undergraduate Supervision**
Various colleges, University of Cambridge
Small-group teaching: discussing problem sheets with students, preparation of [supplementary materials](#), setting and marking progress tests
- Thermodynamics and Power Generation, Part IIA (3 years)
 - Mathematical Methods, Part IB (4 years)
 - Thermofluid Mechanics, Part IB (3 years)
- 2019 **Associate Fellow of the Higher Education Academy**
Teaching Associates Programme, Cambridge Centre for Teaching and Learning

2019, 2017 **Laboratory Demonstration**

Department of Engineering, University of Cambridge

Practical-based teaching: in the laboratory, troubleshooting and guiding students towards applied Engineering insight

- Turboexpander: design and test of radial turbomachinery (2019)
- Advanced-cycle Power Generation: thermodynamics (2017)

Skills and competencies

Experimental Methods for Aerodynamics and Heat Transfer

- Steady and unsteady aerodynamic measurements: pneumatic and hot-wire probe traverses, fast-response pressure transducers
- Infra-red thermography for transient heat transfer measurements
- Mechanical design of experimental apparatus from scratch

Numerical Methods in Fluid Dynamics

- URANS computations for gas turbine aerodynamic analysis
- Large-scale LES computations up to 700 million nodes of film cooling
- Analytical modelling with lumped-parameter, linear approximations

Technical Computing

- General programming ability in Python, MATLAB, bash, Fortran, L^AT_EX
- Scripting for data acquisition, analysis, modelling, and presentation
- Development, documentation, and deployment of software
- Experienced Linux user and open-source software enthusiast; author of Python compressible flow [library](#) with ~40 downloads/month

Academic service

Reviewer for *Journal of Turbomachinery*, ASME Turbo Expo, European Turbomachinery Conference

Undergraduate admissions interviewer for St. John's College and Fitzwilliam College, University of Cambridge

Fitzwilliam College Postdoctoral Society Vice President 2021/22

Referees

Prof. Graham Pullan

✉ gp10006@cam.ac.uk ☎ 01223 339837

Professor of Aerothermal Engineering, University of Cambridge

Dr. Nick Atkins

✉ nra27@cam.ac.uk ☎ 01223 337592

Senior Lecturer in Turbomachinery, University of Cambridge