

# GRAHAM PATRICK BENHAM

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## Education

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10/2014 - 08/2018	DPhil Mathematics St Anne's College, University of Oxford, UK
09/2010 - 06/2014	MSci Mathematics (1st Class) University College London, UK

## Professional Experience

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05/2023 -	Assistant Professor School of Mathematics and Statistics University College Dublin, Ireland
04/2022 - 04/2023	Departmental Lecturer in Applied Mathematics Mathematical Institute and Christ Church College University of Oxford, UK
01/2020 - 12/2021	Postdoctoral Researcher Institute for Energy and Environmental Flows University of Cambridge, UK
09/2018 - 09/2019	Postdoctoral Researcher LadHyX (Laboratoire d'Hydrodynamique X) Ecole Polytechnique, France

## Awards and Prizes

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2019	Chris Reddick Prize InFoMM CDT, University of Oxford
2018	G Research DPhil Prize in Mathematics and Data Science
2017	SIAM Best Student Presentation Award British Applied Maths Colloquium, University of Surrey
2017	Graduate Development Scholarship St Anne's College, University of Oxford

## Teaching Experience

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2022 - 2023	Lecturer, Mathematical Institute, Oxford <i>Topics in Fluid Mechanics</i> Mathematics, Part C
2022 - 2023	Tutor, Christ Church College, Oxford <i>Dynamics, Geometry, Constructive Maths, Differential Equations I &amp; II, Quantum Theory, Mathematical Biology, Probability, Waves and Fluids</i> Mathematics, Prelims and Part A
Jul 2022	Graduate Instructor <i>Fluid Dynamics of Sustainability and the Environment</i> Summer School Ecole Polytechnique, France
2020 - 2021	Tutor, St Catharine's College, Cambridge <i>Electromagnetism, Classical Mechanics, Thermodynamics</i> Physics, Part IB Natural Sciences
Jul 2020	Graduate Instructor UK Graduate Modelling Camp, University of Oxford
May 2020	Graduate Instructor ICMS Graduate Modelling Camp, ICMS, Edinburgh
2016 - 2017	Tutor, St Anne's College, Oxford <i>Dynamics, Geometry, Quantum Theory, Continuous Maths</i> Mathematics, Prelims, Part A
2014 - 2017	Class Tutor, Mathematical Institute, University of Oxford <i>Waves and Compressible Flow, Applied PDE's, Nonlinear Systems, Viscous flow</i> Mathematics, Part A
2013 - 2014	Private tutor for A Level and GCSE Maths Manning's Tutors, London

## Supervised Students

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2022 -	Gabriel Cairns, OCIAM, University of Oxford (with I.J. Hewitt) DPhil project on <i>Subglacial drainage and seawater intrusion</i>
2019	Rafid Bendimerad, LadHyX (with C. Clanet & M. Benzaquen) 4 month Summer project on <i>Wave drag in finite depth water</i>
2019	Xavier Yeponde, LadHyX (with C. Josserand & A. Huerre) 3 month Summer project on <i>Solidification in a conduit</i>

- 2018 Bastien Garitain, LadHyX (with C. Clanet & M. Benzaquen)  
1 month Internship on *Wave drag on asymmetric boats (experiments)*
- 2018 Louis Richard, LadHyX (with C. Clanet & M. Benzaquen)  
1 month Internship on *Wave drag on asymmetric boats (numerics)*

### **Publications** (h-index: 7)

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- [19] GP Benham, SJ Thomson, O Devauchelle. On wave-driven propulsion. (in prep.), 2023.
- [18] GP Benham. Anisotropy distorts the spreading of a fixed volume porous gravity current. (submitted), 2023.
- [17] GP Benham. The near-field shape and stability of a porous plume. *J. Fluid Mech.*, 955, 2023.
- [16] GP Benham, JA Neufeld, and AW Woods. Axisymmetric gravity currents in anisotropic porous media. *J. Fluid Mech.*, 952, 2022.
- [15] GP Benham, O Devauchelle, SW Morris, and JA Neufeld. Gunwale bobbing. *Phys. Rev. Fluids*, 7(7), p.074804, 2022. (*Editor's Choice*).  
Featured in *Physics Magazine* and **Nature** as a *Research Highlight*.
- [14] KP Gilmore, CK Sahu, GP Benham, JA Neufeld, and MJ Bickle. Leakage dynamics of fault zones: experimental and analytical study with application to CO<sub>2</sub> storage. *J. Fluid Mech.*, 931, 2022.
- [13] C Harris, S Jackson, GP Benham, A Muggeridge, and S Krevor. The impact of heterogeneity on the capillary trapping of CO<sub>2</sub> in the Captain sandstone. *Int. J. Greenh. Gas Con.* 112:103511, 2021.
- [12] GP Benham, MJ Bickle, and JA Neufeld. Two-phase gravity currents in layered porous media. *J. Fluid Mech.*, 911, 2021.
- [11] T Babb, GP Benham, J Bows, R Gonzalez-Farina, KB Kiradjiev, WT Lee, and S Tibos. Predicting lift-off time when deep-frying potato dough snacks. *SIAM J. Appl. Math.*, 81(2):574–590, 2021.
- [10] GP Benham, MJ Bickle, and JA Neufeld. Upscaling multiphase viscous-to-capillary transitions in heterogeneous porous media. *J. Fluid Mech.*, 922, 2021.
- [9] GP Benham, R Bendimerad, M Benzaquen, and C Clanet. Hysteretic wave drag in shallow water. *Phys. Rev. Fluids*, 5(6):064803, 2020.
- [8] GP Benham, C Cohen, E Brunet, and C Clanet. Brachistochrone on a velodrome. *Proc. R. Soc. A*, 476(2238):20200153, 2020.

- [7] GP Benham, JP Boucher, R Labbé, M Benzaquen, and C Clanet. Wave drag on asymmetric bodies. *J. Fluid Mech.*, 878:147–168, 2019.
- [6] R Mondal, GP Benham, S Mondal, P Christodoulides, N Neokleous, and K Kaouri. Modelling and optimisation of water management in sloping coastal aquifers with seepage, extraction and recharge. *J. Hydrol.*, 571:471–484, 2019.
- [5] GP Benham, IJ Hewitt, CP Please, and PAD Bird. The effect of inner swirl on confined coaxial flow. (submitted), 2018.
- [4] GP Benham, IJ Hewitt, CP Please, and PAD Bird. Optimal control of diffuser shapes for non-uniform flow. *J. Eng. Math.*, 113(1):65–92, 2018.
- [3] GP Benham, AA Castrejon-Pita, IJ Hewitt, CP Please, RW Style, and PAD Bird. Turbulent shear layers in confining channels. *J. Turbul.*, 19(6):431–445, 2018.
- [2] GP Benham, K Hildal, CP Please, and RA Van Gorder. Solidification of silicon in a one-dimensional slab and a two-dimensional wedge. *Int. J. Heat Mass Transf.*, 98:530–540, 2016.
- [1] GP Benham, K Hildal, CP Please, and RA Van Gorder. Penetration of molten silicon into a bed of fines. *Int. Commun. Heat Mass Transf.*, 75:323–327, 2016.

## Other Publications

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- [2] GP Benham. Mathematical modelling and optimisation of Venturi-enhanced hydropower. DPhil Thesis, University of Oxford, 2018.
- [1] GP Benham. Vortex dynamics in sharp edged domains. Masters thesis, University College London, 2014.

## Research Grants

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- 2022 Marie Curie Global Individual Fellowship (€277k)  
 Total score: 95.0% (successful)  
 3 years of funding between MIT and Ecole Polytechnique  
*I declined this successful grant because I was awarded a Lectureship at the University of Oxford simultaneously*

## Presentations

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- 2022 Fluids seminar, Imperial College London; Waves seminar, Engineering, University of Oxford; CCS workshop seminar, University College Dublin; Fluids seminar, DAMTP, University of Cambridge; OCIAM seminar, University of Oxford; Nonlinear Dynamics seminar, University of Manchester
- 2021 Sports Physics Conference, Lyon, France; Institute of Theoretical Geophysics seminar, University of Cambridge; Mathematical Geoscience seminar, University of Oxford; Isotope coffee seminar,

Department of Earth Sciences, University of Cambridge; Geophysical and Environmental Processes seminar, DAMTP, University of Cambridge

- 2020 Applied maths seminar, University of Cardiff; Applied maths seminar, University College London; Seminar, BP Institute, University of Cambridge
- 2019 Applied maths seminar, University of Limerick, Ireland; APS Division of Fluid Dynamics, Seattle, USA
- 2018 Fluid dynamics seminar, LadHyX, Ecole Polytechnique, France; Presentation for the French Navy visit to LadHyX; Annual presentation with industrial sponsor, VerdErg Renewable Energy, London
- 2017 BAMC, University of Surrey; Woolly Owl Competition, DAMTP, University of Cambridge; APS Division of Fluid Dynamics, Denver, USA; Complex Motion in Fluids, Girton College, University of Cambridge; InFoMM Annual Meeting, Mathematical Institute, University of Oxford; Annual presentation with industrial sponsor, VerdErg Renewable Energy, London
- 2016 BAMC, University of Oxford; OCIAM seminar, Mathematical Institute, University of Oxford; InFoMM Annual Meeting, Mathematical Institute, University of Oxford; Annual presentation with industrial sponsor, VerdErg Renewable Energy, London
- 2015 InFoMM Annual Meeting, Mathematical Institute, University of Oxford; Elkem Silicon, Kristiansand, Norway

### **Conferences Organised**

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- Dec 2022 Workshop on Mathematical Modelling in Carbon Capture and Storage  
Co-organisation of workshop at University College Dublin
- Jun 2022 Colin Please Retirement Conference  
Co-organisation of a conference for the retirement of my former DPhil supervisor, Prof. Colin Please

### **Summer Schools, Workshops & Study Groups**

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- 2020 Participant: Innovative mathematics for the modern industrial strategy workshop, Isaac Newton Institute, Cambridge
- 2018 Participant: Maths with Industry Study Group (MISG), Adelaide, Australia; I38th European Study Group with Industry (ESGI), University of Bath; I46th ESGI, Cyprus

2017	Participant: Complex Motion in Fluids summer school, Girton College, University of Cambridge
2017	Visitor: GFD summer school, Woods Hole Oceanographic Institute, USA
2016	Participant: 125th ESGI, Cyprus University of Technology, Limassol, Cyprus; 116th ESGI, University of Durham
2016	Participant: 11th OpenFOAM Workshop, Guimarães, Portugal
2015	Participant: 107th ESGI, University of Manchester

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**Reviewer**      Journal of Fluid Mechanics, Journal of Sports Engineering

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**Panels**              Selection Committee for Stipendiary Lectureship in Pure Mathematics  
Christ Church College, University of Oxford, 2023

Undergraduate admissions at Christ Church College, 2022; St Anne's College, 2016

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**Outreach**            Keble Mathematics Subject Taster Day (x 2), Oxford, Feb & Mar 2023

Research showcase to the Minister of Sport and the Minister of Higher Education, LadHyX, 2019

Research showcase to high school students, LadHyX, 2019

Mathemagicians walking tour of the city of Oxford, Oxford Maths Festival, 2017

Participated as a mathematician on TV show: Dara O'Briain's School of Hard Sums, Series 1 - 3, 2011 - 2013