

# 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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11/2025 -	Associate Professor
05/2023 - 10/2025	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

## **Career Breaks**

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09/2025 - 04/2026	Parental Leave - 20% Full Time Employment (FTE)
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## **Awards and Prizes**

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2025	European Research Council (ERC) Starting Grant
2024	Climate Fellowship Award, Earth Institute, UCD
2024	OCIAM Visiting Research Fellowship, Mathematical Institute, University of Oxford

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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2023 -	Lecturer, UCD <i>Partial Differential Equations, Multivariable Calculus for Engineers II, Maths of Sustainability and Environment, Applied Complex Variables</i> Applied and Computational Mathematics, 3rd and 4th year
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

## **Supervised Postdocs**

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2025 - Saurabh Kumar, School of Maths and Stats, UCD  
VistaMilk project on *Modelling Soil Moisture in Irish Soils*

## **Supervised Graduate Students**

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2024 - Daire O'Donovan, School of Maths and Stats, UCD  
PhD project on *Interactions between waves and multiple floating bodies*

2022 - Gabriel Cairns, OCIAM, University of Oxford (with I.J. Hewitt)  
PhD project on *Subglacial drainage and seawater intrusion*

2024 Rory Ward, OCIAM, University of Oxford (with I.J. Hewitt)  
MSc project on *Optimisation of a rotating energy storage device*

2023 Mustafa Akman, UCD  
MSc project on *Network-based analysis of fluid dynamics in porous media*

2019 Rafid Bendimerad, LadHyX (with C. Clanet & M. Benzaquen)  
MSc project on *Wave drag in finite depth water*

2019 Xavier Yeponde, LadHyX (with C. Josserand & A. Huerre)  
MSc project on *Solidification in a conduit*

2018 Bastien Garitaine, LadHyX (with C. Clanet & M. Benzaquen)  
Internship on *Wave drag on asymmetric boats (experiments)*

2018 Louis Richard, LadHyX (with C. Clanet & M. Benzaquen)  
Internship on *Wave drag on asymmetric boats (numerics)*

## **Publications (h-index: 9)**

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[23] RC Ward, GP Benham, IJ Hewitt. Optimal operation of floating flywheel energy storage under fluctuating electricity. Submitted, 2025.

[22] RC Ward, IJ Hewitt, GP Benham. Optimal sail angles to drive circular motion. Submitted, 2025.

[21] D O'Donovan, MD Bustamante, O Devauchelle, GP Benham. Achieving optimal locomotion using self-generated waves. Submitted, 2025.

[20] G Cairns, GP Benham, IJ Hewitt. Groundwater dynamics beneath a marine ice sheet. *The Cryosphere*, 19(9), pp.3725-3747, 2025.

[19] GP Benham, SJ Thomson, O Devauchelle. On wave-driven propulsion. *J. Fluid Mech.*, 987, 2024.

[18] GP Benham. Anisotropy distorts the spreading of a fixed volume porous gravity current. *Proc. R. Soc. A.*, 479(2279), p.20230271, 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 Labb  , 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 (€2.1M Total)**

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2025                   ERC Starting Grant (€1.5M)  
                          SurFSUP - Surfing on Free Surfaces by Undulating Propulsion  
                          2x PhD (4 years) and 2x Postdoc (2 years) + lab equipment, travel etc.

2024                   VistaMilk II SFI Centre (€306k)  
                          Soil Modelling Group (Co-I with Lennon O’Naraigh & Saoirse Tracy)  
                          PhD (4 years) and Postdoc (2.5 years) funding on moisture transport  
                          in Irish soils

2023                   Enterprise Ireland (€16k)  
                          Seed funding for writing my ERC Starting Grant Proposal

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 same time*

## **Presentations**

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2025                   European Fluid Dynamics Conference 2, UCD, Ireland.

2024                   Rencontre du Non-Linéaire Conference, Université de Paris Cité;  
                          MACSI Seminar, University of Limerick; APS Division of Fluid Dynamics,  
                          Salt Lake City, USA; PDE Seminar, University of Athens

2023 Applied Maths Seminar, University of Warwick; Seminar at IPGP, Université de Paris; BAMC, Bristol; 3ME Seminar, TU Delft; Lecture at Cargèse Summer School on Waves and Vortices, Corsica; Seminar at the Earth Institute, UCD

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; 138th European Study Group with Industry (ESGI), University of Bath; 146th 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, Physical Review Fluids

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**Panels**      Outreach Committee, School of Maths and Stats, UCD, 2023 -  
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**      "How do ducks move in water", Interview for *The Sports Engineering Podcast*, Spotify

Organising the *Women in Mathematics Day* at UCD, May 9th 2024

Research talks at *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