Jordan McCarney
Curriculum Vitae

School of Mathematical Sciences,
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Education

2022— 2026   **Ph.D. in Mathematics**
"Mathematical Aspects of Internal Wave-Current Interactions"
University College Cork (UCC), Advisor: Dr. David Henry.

2018— 2022   **B.Sc. in Theoretical Physics**
"Roulettes and Pedal Curves: Generation of Road-Wheel Pairs"
National University of Ireland, Galway [now University of Galway (UG)].

Research Interests

My research interests concern the nonlinear analysis of ordinary and partial differential equations, particularly those that arise in the context of geophysical fluid flows in the ocean and atmosphere. Much of my work addresses free-boundary problems. In general though, my interests lie in the use of rigorous mathematics to answer questions which arise in applications.

Publications

2026

[1]   D. Devine and **J.McCarney**. Flow underlying coupled surface and internal waves with rotational lower layer. *In preparation.*

[2]   T.Lyons and **J.McCarney**. Nonlinear temperature dependent enthalpies in exact nonlinear mountain waves, *Differential and Integral Equations, in press.*

2025

[3]   T.Lyons and **J.McCarney**. Temperature dependent precipitation in exact nonlinear mountain waves, *Journal of Mathematical Fluid Mechanics*, 27(3)

2024

[4]   **J.McCarney.** Nonhydrostatic internal waves in the presence of mean currents and rotation, *Journal of Mathematical Physics*, 65(4)

2023

[5]   **J.McCarney.** Exact internal waves in the presence of mean currents and rotation, *Journal of Mathematical Physics*, 64(7)

Awards and Prizes

2024   **Postgraduate Publication of the Year**
UCC College of Science, Engineering and Food Science.

I received this award for my independent research article [4].

Invited Research Presentations

2026

26-28 Aug   **Wave-NED Conference on Mathematics of Wave Phenomena**
Delft University of Technology, Delft, The Netherlands. (Oral Presentation)
Mini Symposium: Internal Waves in the Ocean and Atmosphere

26-29 May   **SIAM Conference on Nonlinear Waves and Coherent Structures**
Concordia University, Montréal, Québec, Canada. (Oral Presentation)
Contributed Presentation: Atmospheric and Mountain Wave Theory.

11 Feb   **Mathematics and Statistics Seminar**
Technological University Dublin, Ireland. (Oral presentation)

2025

18 Nov   **Oberseminar Analysis und Theoretische Physik**
Leibniz Universität Hannover, Germany. (Oral presentation)

16-19 Jun   **"Modelling of fluid propagation: mathematical theory and numerical approximation"** International Centre for Mathematical meetings,
Castro Urdiales, Spain. (Oral presentation)

2 Apr   **Mathematics and Physics Seminar**
South East Technological University, Waterford, Ireland. (Oral presentation)

26 Mar   **PDE Seminar**
University College Cork, Ireland. (Oral presentation)

2024

28-30 Aug   **"Water Waves-Mathematical Theory and Applications"**
University of Plymouth, UK. (Poster and short presentation)

27-31 May   **EWM-EMS Summer School: "Water Waves and Nonlinear Dispersive Equations"**
Mittag-Leffler Institute, Stockholm, Sweden. (Poster and short presentation)

Invited Visits to Research Institutes

2025

16-19 Jun   **International Centre for Mathematical Meetings**, Castro Urdiales, Spain.
"Modelling of fluid propagation: mathematical theory and numerical approximation".

27-31 May   **Mittag-Leffler Institute**, Djursholm, Sweden.
EWM-EMS Summer School: "Water Waves and Nonlinear Dispersive Equations".

22-25 May   **Erwin Schrödinger Institute**, Vienna, Austria.
"The Dynamics of Planetary-scale Fluid Flows".

Supervision

2025/26

B.Sc. Mathematical Sciences Thesis
Ms. Megan Flynn, "Topological degree theory and its applications".

Teaching

Teaching Assistant - UCC
AM4063 Partial Differential Equations with Applications II
AM3063 Partial Differential Equations with Applications I
AM3052 Introduction to Fluid Mechanics and Wave Theories
AM2071 Transform and Variational Methods

Tutor - UCC
AM2071 Transform and Variational Methods
AM2061 Computer Modelling and Numerical Techniques
AM1052 Introduction to Mechanics

Tutor - UG
Physics Undergraduate Problem Solving - Provided one-on-one and small-group tutorial problem-solving sessions for 1st year physics students.

Pedagogical Development - UCC
I successfully completed "PG6003 Teaching and Learning for Graduate Studies", which developed my ability to design, deliver, and critically evaluate inclusive learning experiences by drawing on educational research and evidence to continuously improve student experiences.

Referee Activity

I have been invited to act as a referee for the following international research journals:

- *Journal of Mathematical Physics,*
- *Nonlinear Analysis: Real World Applications,*
- *Qualitative Theory of Dynamical Systems.*