Kevin Dembski

Contact Information

E-mail: kevin.dembski@duke.edu
Office: Gross Hall 304, 140 Science Dr, Durham, NC 27708, USA
Citizenship: Canadian citizen

Education

Duke University, Durham, North Carolina USA
Ph.D. Candidate (August 2021 – Expected May 2026)
Mathematics, *Supervisor*: Professor Tarek M. Elgindi

University of Toronto, Toronto, Ontario CAN

Master of Science (November 2021)
Mathematics, *Supervisor*: Professor Fabio Pusateri

Honours Bachelor of Science (June 2020)
Mathematics and Physics Specialist

Research Interests

Analysis of PDE, Mathematical Fluids (with a focus on singularity formation in incompressible fluids)

Publications and Preprints

Dembski, Kevin H. *Singularity Formation in the Incompressible Porous Medium Equation without Boundary Mass.* 2025. arXiv: 2511.01827 [math.AP].

K. Dembski, T.M. Elgindi *On scale-invariant solutions to the SQG equation* (preprint) 2025

Non-Math Publications

John R. Percy, Kevin H. Dembski, A Study of Pulsation and Fadings in some R Coronae Borealis (RCB) Stars. JAAVSO Volume 46, 2, 2018.

Honours and Awards

L.P. Smith Award for Teaching Excellence; Duke University, 2025
Dean's List Scholar; University of Toronto, 2017 – 2020
New College In-Course Scholarship; Council of New College, 2017 – 2019
NSERC Undergraduate Student Research Award; School of Mathematics and Statistics, Carleton University, 2019
President's Scholar of Excellence; University of Toronto, 2016

Talks and Presentations

• *Singularity Formation in the Incompressible Porous Medium Equation without Boundary Mass*, CUNY Graduate Center Harmonic Analysis and PDE Seminar, January 2026
• *Singularity Formation in the Incompressible Porous Medium Equation without Boundary Mass*, University of California San Diego (online), November 2025
• *Linear Instability of a Shear Flow* (expository)
Duke – UNC joint Spectral Theory Seminar, January 2025
• *Solar Models and the De Gregorio Equation* (expository)
Duke fluids reading group, Fall 2024
• *Global Regularity in the De Gregorio Model* (expository)
Duke Math RTG working seminar (joint with Omar Melikechi), October 2021
• *Blow-Up in Fluid Equations* (expository)
University of Toronto Graduate Analysis Seminar, June 2021
• *Resonant Oscillations in Frustums of Cones*
Canadian Undergraduate Math Conference, July 2019

Teaching Experience

Duke University, Durham, NC, USA

Instructor of Record:

MATH105L Laboratory Calculus and Functions I	**Spring 2025**
MATH112L Laboratory Calculus II	**Fall 2023**

Teaching Assistant:

MATH431 Introduction to Real Analysis	**Spring 2026**
MATH531 Real Analysis I (Graduate)	**Fall 2024**
MATH202D Multivariable Calculus for Economics	**Spring 2023**
MATH111L Laboratory Calculus I	**Fall 2021**

Departmental Tutor:

MATH557 Introduction to Partial Differential Equations (Graduate)	**Spring 2024**

University of Toronto, Toronto, Ontario CAN

Teaching Assistant:

MAT235Y1 Calculus II	**Summer 2021**
MAT224H1 Linear Algebra II	**Fall 2020, Winter 2021**
St. Michael's College Math Success Centre	**Fall 2020, Winter 2021**
MAT135H1 Calculus 1(A)	**Fall 2018**
MAT136H1 Calculus 1(B)	**Winter 2019, Winter 2020**

Schools and Conferences Attended

Partial Differential Equations of Classical Physics, Simons Center, Stonybrook	**July 2025**
Boundary and Singularity in Fluid Mechanics, Simons Center, Stonybrook	**January 2025**
Nonlinear PDEs Summer School, UC Berkeley	**June 2024**
(In)-Stability Phenomena in Fluid Mechanics, Cergy Paris University	**May 2024**
Recent Advances in nonlinear Partial Differential Equations, University of Minnesota	**May 2024**
Summer School in Fluid Dynamics, Brin Mathematics Research Center	**July 2023**
Stability and Dynamics in Fluid Mechanics and Kinetic Theory, Imperial College London	**July 2023**
Summer School: Deterministic and Random Features of Fluids, EPFL	**July 2023**
New Directions in Compressible and Incompressible Flows, Max Planck Institute	**June 2023**
New Trends in Mathematical Fluid Dynamics, Institut Fourier	**June 2023**
Recent Advances in Mathematical Fluid Dynamics, Duke University	**May 2023**
Workshop on Geometry and Analysis of Fluid Flows, Stonybrook University	**January 2023**
Recent Trends in Partial Differential Equations, Duke University	**August 2022**
Summer Program in Partial Differential Equations, University of Texas at Austin	**August 2022**
Summer Workshop on Analysis of PDEs, University of Minnesota	**July 2022**
Small Scale Dynamics in Fluid Motion, Simons Center, Stonybrook	**June 2022**
New Trends in Mathematical Fluid Dynamics, Simons Center, Stonybrook	**March 2022**
New Mechanisms for Regularity, Singularity, and Long Time Dynamics in Fluid Equations*, Banff International Research Station	**July 2021**
Summer Program in Partial Differential Equations*, University of Texas at Austin	**May, 2021**
Summer School on Mathematical Hydrodynamics*, Fields Institute, Toronto	**September, 2020**
Mini-School on Free Surface Hydrodynamics*, Fields Institute, Toronto	**October, 2020**

(∗ indicates an online event)

Service to Profession

Math+, Duke University **Summer 2024**
Graduate student mentor for an undergraduate summer research project
Worked with Aric Wheeler to guide students through modeling a fluid-structure interaction problem

New Connections in Math, Duke University **September 2022**
Graduate student volunteer for an undergraduate research symposium

Association for Women in Math, University of Toronto **November 2020**
LaTeX workshop volunteer

Science Unlimited, University of Toronto **August 2017**
Assistant Program Leader at a science camp for high school students

Volunteer Mathematics Tutor, Huron Heights Secondary School, **2017**