Abderrahmane Benfanich

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Education

09/2024–Present **Ph.D. in Mathematics and Statistics**, *University of Ottawa*, Ottawa, ON
Focus: Theoretical and numerical analysis of infiltration models (Richards equations) and higher-order extensions using Finite Element Methods.

09/2023–09/2024 **Master's in Mathematics and Statistics**, *University of Ottawa*, Ottawa, ON
Fast-tracked to Ph.D. program due to research excellence.
Report: Theoretical and Numerical Analysis of Infiltration Models.

09/2020–06/2023 **Bachelor's in Mathematics and Applications**, *Cadi Ayyad University*, Marrakech, Morocco

Publications

02/2026 **Paper Submitted**, *Journal of Differential Equations*
Benfanich, A., Bourgault, Y., & Beljadid, A. (2026). Mathematical analysis for a doubly degenerate parabolic equation: Application to the Richards equation. *Submitted to Journal of Differential Equations*. arXiv:2602.19037. `https://arxiv.org/html/2602.19037v1`

09/2025 **Paper Submitted**, *Journal of Computational Physics*
Benfanich, A., Bourgault, Y., & Beljadid, A. (2025). A finite element method using a bounded auxiliary variable for solving the Richards equation. *Submitted to Journal of Computational Physics*.

Research Projects

2023–Present **Numerical Analysis of Infiltration Models**, *University of Ottawa*
Developing advanced numerical methods for the Richards equation and its higher-order extensions. The work focuses on modeling water infiltration in porous media to better predict pollutant movement and prevent groundwater pollution, incorporating diffusion and dispersion effects.

Conferences & Specialized Training

07/2025–08/2025 **SIAM/CAIMS Joint Conference**, *Montreal/Online*
Participated in the joint conference and delivered a talk on research findings as part of a mini-symposium.

06/2025–07/2025 **Compute Ontario School**, *Online*
Completed introductory course on Artificial Neural Networks, applying machine learning concepts to computational problems.

06/2024–07/2024 **Summer School in Mathematics**, *Queen's University*, Kingston, ON
Intensive coursework on circulation models, reinforcement learning, Riemann surface topology, and stochastic differential equations.

09/2023–Present **Applied Mathematics Seminar**, *University of Ottawa*
Weekly participation in seminars covering diverse topics in applied mathematics.

Experience

06/2023–Present **Teaching Assistant**, *University of Ottawa*, Ottawa, ON
Organize discussion groups to help students solve complex problems. Grade exams and provide personalized academic support.

09/2023–Present **Research Assistant**, *University of Ottawa*, Ottawa, ON
Conducting theoretical and numerical research on porous media flow for graduate programs.

09/2023–Present **Freelance Tutor**, *Self-Employed*, Ottawa & Gatineau
Provide personalized tutoring for university and high school students in STEM subjects. Develop learning strategies to improve student confidence and grades.

Awards & Distinctions

09/2024 **International Doctoral Scholarship**, *University of Ottawa*
Awarded for research excellence.

09/2024 **Admission Scholarship**, *University of Ottawa*
Awarded upon admission to the Ph.D. program.

2023–2024 **Supervisor's Scholarship**, *University of Ottawa*
Received during tenure as Research and Teaching Assistant.

2023–2024 **Partial Exemption Scholarship**, *University of Ottawa*
Merit-based exemption for international francophone students.

Skills

Mathematics Numerical Analysis, Partial Differential Equations, Finite Element Methods, Statistics

Programming Python, C++, FreeFem++, LaTeX

Languages English, French

Community Involvement & Interests

Ongoing **Math Help Center Tutor**, *University of Ottawa*
Provide drop-in support for students, facilitating collaborative learning and understanding of core concepts.

Athletics **Track and Field, Competitive Level**
Specialized in Discus and Shot Put. Competed in regional competitions, demonstrating discipline and perseverance.