

NOUR-EDDINE TOUTLINI

UM6P - University Mohammed VI Polytechnic, Lot 660, Ben Guerir 43150, Morocco

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[ResearchGate](#) • [Google Scholar](#) • [GitHub](#)

Research interests

Flows in porous media; coupled transport phenomena in heterogeneous unsaturated soils; hydrological modeling; numerical methods; development of physical-based numerical models for the water-soil-atmosphere continuum; finite element methods; applied mathematics; GPU implementation; numerical modeling and analysis; computational mathematics; scientific computing; physics-informed neural networks (PINNs); deep neural operators (DeepONet), Hybrid numerical methods and deep learning for scientific computing.

Education

Doctorate in Joint program

2022–Present

Mechanical Engineering — École de technologie supérieure, Montreal, Canada

Applied Mathematics — University Mohammed VI Polytechnic, Morocco

Dissertation: *Development of physics-based numerical models for the hydrodynamic and transport of fertilizers in soils, validation of the models, and proposition of solutions to improve the use of fertilizers in agriculture*

Master in Applied Mathematics and Data Science (Joint program)

2020–2022

Université Sorbonne Paris Nord, Paris, France

Faculté des Sciences, Fès, Morocco

Bachelor of Science in Applied Mathematics

2017–2020

FP Beni-Mellal, Morocco

Teaching Experience

Course Instructor

June 2025

Finite Element Methods for Predoctoral Students — UM6P

One-month intensive course

Mathematics Tutor

2021–2023

Freelance — Private mathematics instruction

Publications

Toutlini, N., Beljadid, A., Soulaïmani, A. (2025). A semi-implicit second-order temporal scheme for solving the pressure head-based form of Richards' and advection-dispersion equations. *Computers & Mathematics with Applications*. <https://doi.org/10.1016/j.camwa.2025.03.011>

Toutlini, N., Soulaïmani, A., Beljadid, A. (2025). JAX-WSPM: A GPU-accelerated parallel framework based on the JAX library for modeling water flow and solute transport in unsaturated porous media using an implicit finite element method. *Computer Physics Communications*. Under review with positive comments.

Toutlini, N., Beljadid, A., Soulaïmani, A. (2025). A semi-implicit finite element method for modeling fertilizers transport through soils with root water and nutrients uptake. *Mathematics and Computers in Simulation*. Under review.

Toutlini, N., Kamil, H., Soulaïmani, A., Beljadid, A. (2024). A predictor-corrector second-order time-stepping scheme for solving water flow and solute transport in unsaturated porous media. *World Congress on Computational Mechanics (WCCM2024)*, Vancouver, BC, Canada. https://www.scipedia.com/public/Toutlini_et_al_2024a

Presentations

[Speaker] Toutlini, N., Beljadid, A., Soulaïmani, A. (2025). A semi-implicit finite element technique for the advection-diffusion-reaction model of fertilizer transport in soil. *SIAM Conference on Applied and Computational Discrete Algorithms (ACDA25)*, July 30–August 1, 2025, Montréal, Quebec, Canada.

Toutlini, N., Kamil, H., Soulaïmani, A., Beljadid, A. (2024). A predictor-corrector second-order time-stepping scheme for solving water flow and solute transport in unsaturated porous media. *World Congress on Computational Mechanics (WCCM2024)*, July 21–26, 2024, Vancouver, BC, Canada.

Toutlini, N., Beljadid, A., Soulaïmani, A. (2024). Modeling of fertilizer transport in soil under subsurface drip irrigation. *International Conference on Computational Engineering and Artificial Intelligence (I2CEAI 2024)*, Khouribga, Morocco.

Toutlini, N., Beljadid, A., Soulaïmani, A. (2024). Numerical modeling of water flow and fertilizer transport in unsaturated porous media. *UM6P Doctoral Days*, 3rd Edition, Ben Guerir, Morocco.

Honors and awards

Natural Sciences and Engineering Research Council (NSERC) Fellowship
École de technologie supérieure, Montreal, Canada

2023–Present

UM6P/OCP Group Fellowship University Mohammed VI Polytechnic, Morocco	2022–Present
Canadian Association for Computational Science and Engineering (CACSE) Travel Award WCCM-PANACM Conference, Vancouver, Canada	2024
Research Dissemination Fellowship (Bourse de diffusion de la recherche) École de technologie supérieure, Montreal, Canada	2025

Technical skills

Programming Languages: Python, MATLAB, FreeFem++, Fortran, CUDA Fortran
Scientific Libraries: JAX, NumPy, SciPy, Matplotlib, MPI, CuBlas, LAPack
Numerical Software: FreeFem++, HYDRUS 1D/2D/3D, Paraview, ANSYS
High Performance Computing: GPU Programming, Parallel Computing with JAX and CUDA
Development Tools: Git, Linux, LaTeX, GitHub

Languages

Arabic , French , English
