

# Nail Baloul

*PhD Student in Applied Mathematics*

*CERMICS, École nationale des ponts et chaussées*

## Profile

Since October 2024, I have been a PhD student at CERMICS (École nationale des ponts et chaussées). My research focuses on traffic flow modelling, PDE control, inverse problems, and learning-based methods for PDE-constrained systems.

## Education

- Oct. 2024 – **PhD in Applied Mathematics**, *École nationale des ponts et chaussées*, Champs-sur-Marne
- Sept. 2027 Supervisors: Pierre Lissy (Junior Professor, CERMICS), Thibault Liard (Associate Professor, XLIM), Amaury Hayat (Professor, CERMICS). Topic: traffic state reconstruction and management using mathematical analysis and machine learning.
- Sept. 2023 – **Master's Degree in Optimization**, *University of Paris-Saclay*, Gif-sur-Yvette
- Sept. 2024 Advanced optimization techniques: convex analysis, calculus of variations, stochastic optimization, non-smooth optimization, game theory. Optimal control, dynamical systems, optimal transport and geometric methods.
- Sept. 2021 – **Master of Science in Analysis, PDEs and Applications**, *University of Sciences and Technology Houari Boumediene*, Algiers
- July 2023 Master's thesis: *General Decay for a Viscoelastic Plate Equation with a Time Delay*. Focus on functional analysis, distributions, semigroups, finite element methods, Galerkin methods, epidemiology and fluid mechanics.
- Sept. 2018 – **Bachelor of Science in Pure Mathematics**, *University of Sciences and Technology Houari Boumediene*, Algiers
- July 2021 Bachelor's thesis: *On Locally Compact Spaces and Alexandroff Compactification*.

## Research Experience

- Apr. 2024 – **Research Internship**, *UMA Laboratory, ENSTA Paris*, France
- Aug. 2024 Supervisor: Prof. Sorin Mihai Grad. Study of proximal algorithms for constrained optimization problems.
- Jan. 2023 – **Research Internship**, *AMNEDP Laboratory, USTHB*, Algiers, Algeria
- June 2023 Supervisor: Prof. Ammar Khemmoudj. Analysis of the well-posedness and asymptotic behaviour of a physical system.

## Publications

- 2025 **Traffic Flow Reconstruction from Limited Collected Data**. Nail Baloul, Amaury Hayat, Thibault Liard, Pierre Lissy. *Proceedings of the 64th IEEE Conference on Decision and Control (CDC 2025)*, IEEE, December 2025, Rio de Janeiro, Brazil.

## Conferences and Workshops

- 2026 DMV Annual Meeting, Konstanz, Germany, 7–10 September 2026 (paper presentation, upcoming).
- 2026 XI PDE, Optimization, Numerics, and Machine Learning, Benasque, Spain, 23 August – 4 September 2026 (upcoming).
- 2026 CANUM 2026, Saint-Jacut-de-la-Mer, France, 1–5 June 2026 (paper presentation).
- 2025 CDC 2025, Rio de Janeiro, Brazil, 10–12 December 2025 (paper presentation).

- 2025 CDC 2025 Workshop — Neurocomputation and Dynamics, 9 December 2025.
- 2025 PGMO Days 2025, Paris-Saclay, France, 18–19 November 2025 (paper presentation).
- 2025 Conference on Control of PDEs and Related Topics, Toulouse, France, 30 June – 4 July 2025.
- 2025 SMAI 2025, Carcans-Maubuisson, France, 2–6 June 2025 (paper presentation).
- 2025 EECI IGSC 2025 — Multi-agent optimization and learning: resilient and adaptive solutions, University College London, UK, 6–9 May 2025.
- 2024 PGMO Days 2024, Paris-Saclay, France, 19–20 November 2024.

## Seminars

- 2026 Speaker, Young Researchers Seminar, CERMICS, École nationale des ponts et chaussées, France, 21 July 2026 (scheduled).
- 2025 Speaker, MOD Seminar, XLIM Laboratory, Université de Limoges, France, 10 October 2025.
- 2025 Speaker, Faculty of Mathematics Seminar, USTHB, Algiers, Algeria, 6 October 2025.
- 2025 Speaker, Journées Scientifiques des Jeunes du CERMICS (JSJC), Parent, France, 2–4 April 2025.

## Academic Service

- 2026 Member of the organizing committee, CJCMA 2026, Champs-sur-Marne, France, 2–4 March 2026.
- 2025– Member of the organizing team, Young Researchers Seminar, CERMICS, ENPC (since October 2025).
- 2026–2027 Co-led BOUM Project 2026–2027 (with Martin Chassard), organizing a scientific event in Île-de-France for young researchers in Control and Artificial Intelligence.

## Teaching

- 2025–2027 Teaching Assistant (TD), PDE Modeling, ENPC.
- 2025–2027 Teaching Assistant (TD), Calculus for Engineers, ENPC.
- 2025–2027 Teaching Assistant (TD), Analysis, ENPC.
- 2025–2026 Instructor, AI Workshops, ENPC.
- 2025–2026 Project Supervisor, Second-Year Engineering Project, ENPC.

## Skills

Qualitative analysis, problem solving, critical and analytical thinking, adaptability.  
 Scientific computing with Python, MATLAB, and Julia.

## Languages

- French C1
- English B2
- Arabic C1