

Baptiste Leroux

PhD Candidate in Applied Mathematics — Modelling & Optimization

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SKILLS

Programming: Python (NumPy, Pandas, SciPy, CasADi), Git

Numerical Methods: Constrained optimization, numerical linear algebra, graph/model reduction, gradient-based methods

Statistics: Bayesian inference, MCMC, PDEs

Simulation: MATSim (traffic simulation), Dassault 3DEXPERIENCE

LANGUAGES

French: Native

English: Fluent — C1 (IELTS)

EDUCATION

PhD in Applied Mathematics 2023 – 2026

IFP Énergies nouvelles / ETH Zürich Rueil-Malmaison / Zürich

- Mathematical modelling and optimization applied to road traffic systems (see Research Experience)

Engineering Degree 2019 – 2023

Enseirb-Matméca, Bordeaux INP Bordeaux

- Major in applied mathematics and mechanics
- Specializations in fluid mechanics, Bayesian methods, and data analysis

Erasmus+ Exchange Year 2020 – 2021

Fontys University Eindhoven, Netherlands

- Software Developer

Preparatory Classes — PCSI/PC 2017 – 2019

Lycée Dupuy de Lôme Lorient, France

INTERESTS

Table Tennis: High-level competitive practice (GVHTT Hennebont); coaching at international training camps

RESEARCH & PROFESSIONAL EXPERIENCE

PhD Candidate in Modelling & Optimization Nov. 2023 – Nov. 2026

IFP Énergies nouvelles / ETH Zürich Rueil-Malmaison / Zürich

- Development of an analytical model for *backcasting* (Linear Analytical Model, LAM) to assess the impact of public policies on urban road traffic and transport-related carbon emissions, within the ANR FORBAC project.
- Formulation of the static traffic equilibrium problem, derivation and implementation of exact analytical gradients using linear algebra, with capacity and non-negativity constraints.
- Development of a graph-reduction methodology to reduce computational complexity while preserving origin-destination travel times of the full-scale network.
- Numerical validation on synthetic and real-world urban networks, including Sioux Falls and Lyon, with travel-time reproduction generally above $R^2 = 0.95$.
- Three papers submitted to *Transportation Research Part B*; presentations at WCTR 2026 (Toulouse) and MT-ITS.

ESG Data Analyst Feb. – Aug. 2023

Iceberg DataLab Paris

- Analysis of the climate and biodiversity impacts of publicly listed companies to provide ESG data to asset managers.
- Processing and analysis of large datasets in Python (Pandas) to identify methodological biases in the underlying model.
- Collaboration with analysts and financial institutions to assess and improve data quality.

Data Scientist – Research Intern June – Sept. 2022

L2S Laboratory, CentraleSupélec Paris-Saclay

- Estimation of astrophysical parameters using MCMC-based predictive methods combined with Bayesian inference.

Industrial Project – Smart City Oct. 2022 – Jan. 2023

Dassault Systèmes Paris

- Modelling of smoke propagation following a chemical release within an urban environment using the 3DEXPERIENCE platform.
- Collaboration with industry professionals and engineering students.

Research and Engineering Projects 2019 – 2023

Enseirb-Matméca Bordeaux

- Modelling of wave propagation in coastal environments.
- Optimization of aircraft range as a function of wing area.
- Optimization of solid-propellant rocket motor height as a function of propellant mass.