Email : raphael.lecoq [at] ens-paris-saclay.fr
Homepage: perso.eleves.ens-rennes.fr/people/raphael.lecoq
Github : /raphaelecoq
Linkedin : /in/raphael-lecoq

Updated May 2026

Raphaël LECOQ

APPLIED MATHEMATICS GRADUATE IN SYSTEMS COMPLEXITY REDUCTION

Specialized in Numerical Methods for PDEs, Machine Learning, Reduced Order Models, and Data Assimilation to reduce the computational cost of simulating for real-time applications, low energy embedded systems and optimization.

EDUCATION

2024-2025
Paris, France

2nd year MSc Mathematical Modeling major PDEs and Data Science
Sorbonne Université (Highest Honours)

2022-2026
Rennes, France

Ecole Normale Supérieure de Rennes diploma
Mathematics licence / Physics licence / 1st year MSc Pure mathematics.
ENS Rennes, Université de Rennes

2019-2022
Tours, France

CPGE Mathematics and Physics
Intensive Maths and Physics (MP). Admitted at ENS Rennes as trainee civil servant.
Descartes Highschool

EXPERIENCE

May–August 2026
Saclay, France

Laboratoire de Mécanique Paris-Saclay, ENS Paris-Saclay | Research internship
Focus on different methods, especially Proper Generalized Decomposition, to create reliable ROM of power modules.
- Development of PGD software. Benchmark against other Reduced Basis Methods.
- Use of AI for data assimilation.

Partnership with **SAFRAN** for industrial applications benchmark.

Nov 2025-April 2026
Shanghai, China

Shanghai Jiao Tong University, Paris Elite Institute of Technology | Research internship
Developed a method to compress a **Reduced Basis** (RB) coefficients manifold into a few latent variables using **Machine Learning**. The model is used to learn the full RB coefficient vector from a reduced subset of coefficients.
- Implemented **online data assimilation** on the compressed-reduced model in **Python** (**sklearn, tensorflow, skfem**), enabling state reconstruction from **sparse observations**.
- Reduced online system from 199 variables to 2 compared to **Empirical Interpolation Method**.
- **Mentored** a SJTU bachelor student on reduced order modeling with **collaborative development** using **Git**.

Collaboration with Yvon MADAY (Sorbonne Université).

April-September 2025
Saclay, France

CEA Saclay (French Atomic Agency) | R&D internship
Developed a 2D **Discontinuous Galerkin**-based error indicator in **MATLAB** for heterogeneous diffusion.
- Performed **local adaptive mesh refinement** using the error indicator and achieved **optimal** O(h) **convergence rates** for low-regularity solutions with P1 approximation.
- Reduced computation time by **10x for 1000 degrees of freedom** over uniform mesh refinement to obtain the same error tolerance.

May-August 2024
Pisa, Italy

Institute of Biorobotics, Sant'Anna Scuola Superiore Pisa | Research internship
Research on methods to reduce the computational complexity of large scale CFD applications.
- Conducted a literature review on numerical simulations (**FVM, FEM, DGM**) and **reduced basis method**.
- Adaptation of a reduced basis generation for continuous **Finite Elements** through formulating **Finite Volumes** in the **Discontinuous Galerkin** variational form.

May-July 2023
Saclay, France

Laboratory of Theoretical Physics and Statistical Models, CNRS | Research internship
Modeling, simulation and statistical analysis of branching stochastic processes.
- Implemented stochastic simulations of branching particle systems to study growth and clustering dynamics.
- **Simulations** and **statistical comparison** of stochastic processes.

Collaboration with CEA Saclay.

EXPERTISE

Langages	Tools and Environments	Simulation	Machine Learning
English C1 (TOEIC 955/990)	MATLAB, Python, C++ (basics)	FreeFEM++	Tensorflow, sklearn
French mother tongue	Linux, Github/Git	scikit-fem, FENICS	Jupyter, pandas

MISCELLANEOUS

Student jobs and volunteering

CEA CAPA – 2026 Summer intensive Calculus III (50 hours). English taught.
Optimal Sup-Spé – Tutoring or tutorial and mock exams for CPGE students, 4 hours/saturday (since 2025).
Tutor for CPES SEnS bachelors of ENS Rennes (2023-2024).
Private mathematics and physics teacher (2021-2025).
Summer jobs at Farm Chailloux and ICO Angers (2016-2022).

Hobbies

Table tennis, Wakeboard, Photography, Clarinet, Motorbikes