Averil Prost | PhD student in Applied Mathematics

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Born 22th Feb. 2000 in Albertville.
French nationality.

Academic background

PhD in Applied Mathematics, with Nicolas Forcadel and Hasnaa Zidani *since Oct. 2022*
LMI - Laboratory of Mathematics of INSA
- Control problems in networks and applications to urban traffic
- Scolarship of INSA Rouen

Engineering diploma in Applied Mathematics *2017-2022*
National Institute of Applied Sciences - INSA Rouen
- Functional and numerical analysis for PDEs, deterministic control theory

Master in Fundamental and Applied Mathematics *2021–2022*
University of Rouen Normandie
- Viscosity solutions, Markov processes, particle systems

Integration of Graduate School MINMACS *2021–2022*
Excellence scolarship in M2

Participation to projects

ANR COSS - Control over Stratified Structures *2023-2026*
National Research Agency project

COPTI - Optimal control for mathematical modelling and numerical simulation with applications in environment, transport and image processing *2021-2025*
European excellence chair on OPTImal Control

ANID-ECOS - Sensitivity Analysis of State Constrained Optimal Control Problems *2021-2023*
Chilean-French research cooperation project

Mobility

CMM Visiting program **UTFSM, Valparaíso**
6-months academic stay in the Technical University Federico Santa María *1st July - 22th Dec. 2023*

Thematic schools

SEME - Research summer school **Pointe-à-Pitre**
Academic-Industry research week (Semaine d'Étude Mathématique-Entreprise) *15th May - 19th May 2023*
- On a workaround for an overflow in streaming process mining.

https://hal.science/hal-04108539

Summer school on Mean-Field Games **Centre Henri Lebesgue**
Mini-courses by François Delarue, Pierre-Emmanuel Jabin and Eva Löcherbach *12th June - 16th June 2023*

CEMRACS - Vlasov-Poisson plasma sheath **CIRM**
Summer school on Transport in Physics, Biology and Urban traffic *15th July - 31th Aug. 2022*
- Numerical methods for a bispecies plasma sheath with absorbing wall.

https://hal.science/hal-03926305/

Internships

Numerical methods for Hamilton-Jacobi equations — **Lab. J.L. Lions**
Master internship (4.5 months) with Olivier Bokanowski — *1st Mar. - 15th Jul. 2022*
- Semi-Lagrangian scheme for obstacle problems with neural networks.

`https://github.com/averil-prost/numHJ`

Implicit-explicit scheme for the wave equation — **CEA Saclay**
Undergraduate internship (3 months) with Alexandre Impériale — *Jun - Aug. 2021*
- Multi-scale semi-implicit scheme in inhomogeneous media, with finite elements.

`https://www.github.com/averil-prost/Wonderbubbleland`

Teaching activities

Numerical methods for Partial Differential Equations — **INSA Rouen**
4th year, dep. of Mathematics. Course and exercise sessions. — *Jan. - May 2023*
Introduction to spectral theory, parabolic/hyperbolic second order equations.

Numerical optimization — **INSA Rouen**
4th year, dep. of Mathematics. Exercise sessions. — *Sept. - Dec. 2022*
Optimality conditions, KKT conditions, simplex algorithm.

Introduction to probability — **INSA Rouen**
2th year, Common cursus. Exercise sessions. — *Sept. - Dec. 2022*

Service for the community

Organizer of the doctoral seminar — **UTFSM, Valparaíso**
Joint seminar (Καφεμινάριο) between the consortium of universities of Valparaíso — *July - Dec. 2023*
`https://whitengine.github.io/2023/09/cafeminario/`

Elected representant of the doctoral students — **INSA Rouen**
Participation to the scientific council of the institution — *since Oct. 2022*

Vulgarization and diffusion of mathematics — **INSA Rouen**
Organization of school visits to INSA Rouen — *sporadic*
supervision of middle school 1-week internships

Oral communications

Using optimal transport to define viscosity solutions of control problems — **FoCM 2023**
Poster in Foundations of Computational Mathematics (FoCM) — *June 2023*
`https://averil-prost.github.io/files/posters/FoCM23.pdf`

A neural network Lagrangian scheme for HJB equations — **SMAI 2023**
Talk in the 11th French Biennial of Applied and Industrial Mathematics — *May 2023*
`https://averil-prost.github.io/files/presentations/SMAI2023.pdf`

Quadratic is the new smooth: a notion of viscosity for control problems in $\mathscr{P}_2(\mathbb{R}^d)$ — **LMI Seminar**
Talk in the Optimization and Control research group seminar — *April 2023*
`https://averil-prost.github.io/files/presentations/BPviscosity.pdf`

Publications

Comparison between geometrical and analytical viscosity solutions for control problems in the Wasserstein space — *in preparation*

Viscosity solutions of centralized control problems in measure spaces — *in preparation*
Joint work with O. Jerhaoui and H. Zidani

Neural networks for first order HJB equations and application to front propagation with obstacle terms *published*
Joint work with O. Bokanowski and X. Warin
`https://link.springer.com/article/10.1007/s42985-023-00258-8`

High order numerical methods for Vlasov-Poisson models of plasma sheaths *submitted*
Joint work with V. Ayot, M. Badsi, A. Crestetto, N. Crouseilles, M. Mehrenberger and C. Tayou-Fotso
`https://hal.science/hal-03926305/`

Master's thesis - First approach of non-linearity
Introduction to Navier-Stockes equation and their control
`https://github.com/averil-prost/NonLinearite`

Miscellaneous

Spoken languages
- French: native speaker
- English: C1, 990/990 at TOEIC (2021)
- Spanish: B1

Programming languages
- Favorites: C++, Julia, Matlab
- Comfortable: Python
- Beginner: R, Fortran