# Averil Aussedat | PhD student in Applied Mathematics

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Born 22$^{th}$ 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* *1$^{st}$ July - 22$^{th}$ Dec. 2023*

## Thematic schools

**SEME - Research summer school** **Pointe-à-Pitre**
*Academic-Industry research week (Semaine d'Étude Mathématique-Entreprise)* *15$^{th}$ May - 19$^{th}$ 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* *12$^{th}$ June - 16$^{th}$ June 2023*

**CEMRACS - Vlasov-Poisson plasma sheath** **CIRM**
*Summer school on Transport in Physics, Biology and Urban traffic* *15$^{th}$ July - 31$^{th}$ 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-aussedat/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-aussedat/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

**Member of the local organizing committee** — **UTFSM, Valparaíso**
*Workshop Optimal control and Applications* — *Dec. 2023*

**Organizer of the doctoral seminar** — **UTFSM, Valparaíso**
*Joint seminar (Καφεμιναριο) 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

**Befriending $\mathscr{P}_2(\mathbb{R}^d)$: viscosity solutions of centralized control problems in measure spaces** — **WOpCoT**
*Talk in the Workshop Optimal Control and Applications, Valparaíso* — *December 2023*
`https://averil-aussedat.github.io/files/presentations/befriend.pdf`

**Using optimal transport to define viscosity solutions of control problems** — **FoCM 2023**
*Poster in Foundations of Computational Mathematics (FoCM)* — *June 2023*
`https://averil-aussedat.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-aussedat.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-aussedat.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** *submitted*
*Joint work with O. Jerhaoui and H. Zidani*
`https://hal.science/hal-04335852`

**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-aussedat/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