

Dylan Dronnier

RESEARCH SCIENTIST IN APPLIED MATHEMATICS AND DATA SCIENCE

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Experience

Thales Alenia Space

Cannes

RESEARCH SCIENTIST IN MATHEMATICS AND DATA SCIENCE

September 2023 - Now

- Generate a database from a multibody dynamics simulation software system and use it to train surrogate models, accelerating computationally intensive engineering processes like design optimization, design space exploration, and sensitivity analysis.
- Explore innovative approaches for designing vision-based spacecraft guidance, navigation and control systems using reinforcement learning. I supervised two interns from École Polytechnique and a student from ISAE-SUPAERO on this project. I mentored several students projects on this topic.
- Apply data fusion techniques for orbit tracking with multiple sources.

Neuchâtel University

Neuchâtel

POSTDOCTORAL RESEARCHER

January 2022 - March 2023

One year fully committed to my research (with no formal teaching duties). I supervised a second-year student from ENS Paris-Saclay during his internship at the mathematical institute. I participated in a workshop on reinforcement learning and collaborated with a researcher specialized in this topic.

Münster university

Münster

RESEARCH INTERN

January 2017 - July 2017

Study the mathematical properties of the exclusion process and implemented a Monte-Carlo algorithm with variance reduction in order to compute the so-called self-diffusion matrix.

ONERA

Châtillon

RESEARCH INTERN

July 2016 - December 2016

Work on discontinuous Galerkin methods with *a posteriori* error estimates to solve hyperbolic equations describing a multiphasic flows.

Education

École des Ponts

Champs-sur-Marne

PH.D. IN APPLIED MATHEMATICS

October 2018 - November 2021

- **Title:** *Epidemics models in infinite-dimension and optimal vaccination strategies*
- **Supervisors:** Jean-François Delmas and Pierre-André Zitt
- **Description:** I propose a new way of modelling human contacts relevant to the spread of contagious diseases using mathematical objects coming from graph theory called graphons. I study the dynamic and control of epidemics with this new perspective.
- **Manuscript:** www.hal.science/tel-03541695v1

Sorbonne Université (ex Université Paris VI)

Paris

MASTER OF SCIENCE, WITH HONORS.

September 2017 - August 2018

Majored in probability theory and statistics.

École des Ponts

Champs-sur-Marne

ENGINEER'S DEGREE, WITH HONORS.

September 2014 - August 2018

Majored in mathematics and computer science.

Skills

Programming Python (advanced), Rust (advanced), C++ (intermediate), OCaml (intermediate)

ML/DL library Jax, Flax, Scikit-learn, Numpy

OS/Software Strong knowledge of GNU/Linux, Git, Docker

Languages English (fluent), French (fluent)

Miscellaneous

- Takeda Poster Award for Mathematical Epidemiology for my presentation at the Society for Mathematical Biology Annual Meeting held on June 2021.
- “Territoires” prize for my PhD thesis awarded by *la communauté d’agglomération Paris-Vallée de la Marne*.
- Finalist of the competition *Ma thèse en 180 secondes* (French equivalent of Three Minutes Thesis).

List of publications

Preprints

- [1] J.-F. Delmas, D. Dronnier, and P.-A. Zitt, “Targeted Vaccination Strategies for an Infinite-dimensional SIS model,” *arXiv*, Aug. 2021, doi: 10.48550/arXiv.2103.10330.
- [2] J.-F. Delmas, D. Dronnier, and P.-A. Zitt, “Vaccinating according to the maximal endemic equilibrium achieves herd immunity,” *arXiv*, Nov. 2022, doi: 10.48550/arXiv.2211.15463.
- [3] J.-F. Delmas, D. Dronnier, and P.-A. Zitt, “Optimal vaccination: Cordons sanitaires, reducible population and optimal ray,” *arXiv*, Dec. 2022, doi: 10.48550/arXiv.2209.07381.

Journal articles

- [4] J.-F. Delmas, D. Dronnier, and P.-A. Zitt, “Transformations preserving the effective spectral radius of a matrix,” *Linear and Multilinear Algebra*, 2025, doi: 10.1080/03081087.2024.2447523.
- [5] J.-F. Delmas, D. Dronnier, and P.-A. Zitt, “The effective reproduction number: Convexity, concavity and invariance,” *Journal of the European Mathematical Society*, 2024, doi: 10.4171/JEMS/1431.
- [6] J.-F. Delmas, D. Dronnier, and P.-A. Zitt, “Optimal vaccination: various (counter) intuitive examples,” *Journal of Mathematical Biology*, vol. 86, no. 2, 2023, doi: 10.1007/s00285-022-01858-5.
- [7] J.-F. Delmas, D. Dronnier, and P.-A. Zitt, “An infinite-dimensional metapopulation SIS model,” *Journal of Differential Equations*, vol. 313, pp. 1–53, 2022, doi: 10.1016/j.jde.2021.12.024.
- [8] D. Dronnier and F. Renac, “Adjoint-Based Adaptive Model and Discretization for Hyperbolic Systems with Relaxation,” *Multiscale Modeling & Simulation*, vol. 17, no. 2, pp. 750–772, 2019, doi: 10.1137/18M120676X.