Rémy Hosseinkhan-Boucher

Postdoctoral Researcher at Centre de Mathématiques Appliquées (CMAP), École Polytechnique

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LinkedIn
GitHub
Math StackExchange

Experience

2025-2027 **Centre de Mathématiques Appliquées (CMAP), École Polytechnique** - Palaiseau, France

Postdoctoral Researcher

Research on scientific machine learning methods for solving and controlling parametric partial differential equations (PDEs). Development of operator learning techniques. Application to fluid dynamics and turbulence modeling. Research team: HPC@Maths.

Scientific Leads: Marc Massot, Charles-Albert Lehalle

2021–2025 **Laboratory of Interdisciplinary Digital Sciences (LISN), Université Paris-Saclay** - Orsay, France

Ph. D. Candidate (Full-time): *On Learning-based Methods for Dynamical Systems Control: Application to Computational Fluid Dynamics.*

Activities: Research, software development, scientific communication, teaching, reviewing, internship supervision.

Conference publications. Research groups: DATAFLOT; Learning & Optimisation (A&O); Inria TAU.

Advisors: A. Vilnat, O. Semeraro, L. Mathelin.

2020–2021 **Inria TAU (TAckling the Underspecified), IFP Énergies Nouvelles** - Gif-sur-Yvette, France

Research Intern

Learning-based methods for solving stiff differential equations. Koopman operator theory and Physics Informed Neural Networks (PINNs).

Advisors: Michele Alessandro Bucci, Thibault Faney, Cédric Mehl

2019–2020 **BNP Paribas Real Estate** - Issy-les-Moulineaux, France

Data Scientist

Cluster analysis using k-means and Gaussian mixtures. Temporal analysis of clusters inspired by NLP-based dynamic word embeddings. Exploratory data analysis, feature engineering, and variable selection with ANOVA and PCA.

2019 **Capital Fund Management (CFM)** - Paris, France

Quantitative Research Intern

Anomaly detection methods for financial time series. Modeling with ARIMA, GARCH, and Facebook PROPHET. Parameter estimation of heavy-tailed distributions (Levy).

2018 **Luxurynsight** - Paris, France

Deep Learning Research Intern

Deep learning models for Natural Language Processing (NLP) tasks with RNN, GRU, LSTM neural networks. Embedding techniques and multi-class classification.

Education

2021–2024 **Université Paris-Saclay**

Ph.D. in Computer Science

On Learning-based Control of Dynamical Systems: Application to Computational Fluid Dynamics
Advisors: Anne Vilnat, Onofrio Semeraro, Lionel Mathelin

2014–2020 **Université Paris Dauphine - PSL**

M.Sc. in Artificial Intelligence, Systems, Data
Statistical Learning, Markov Decision Processes, Parallel Computing

M.Sc. in Statistics and Data Analysis for Financial Engineering
Time Series Analysis, Stochastic Calculus, Nonparametric Statistics

B.Sc. in Applied Mathematics
Advanced Probability Theory, Stochastic Processes, Parametric / Bayesian Statistics

Publications

Google Scholar
ORCID

Peer-reviewed Conference Proceedings

C1. Pradeleix, E., **Hosseinkhan-Boucher, Rémy**, Shilova, A., Semeraro, O. & Mathelin, L. *Learning non-Markovian Dynamical Systems with Signature-based Encoders* in *Proceedings of the 2nd ECAI Workshop on "Machine Learning Meets Differential Equations: From Theory to Applications"* (eds Coelho, C., Zimmering, B., Costa, M. F. P., Ferrás, L. L. & Niggemann, O.) **277** (PMLR, 26 Oct 2025), 1–25. https://proceedings.mlr.press/v277/pradeleix25a.html.

C2. **Hosseinkhan Boucher, Rémy**, Douka, S., Semeraro, O. & Mathelin, L. *Increasing information for model predictive control with semi-Markov decision processes* in *Proceedings of the 6th Annual Learning for Dynamics & Control Conference* (eds Abate, A., Cannon, M., Margellos, K. & Papachristodoulou, A.) **242** (PMLR, July 2024), 1400–1414. https://proceedings.mlr.press/v242/hosseinkhan-boucher24a.html.

C3. **Hosseinkhan Boucher, Rémy**, Semeraro, O. & Mathelin, L. *Evidence on the Regularisation Properties of Maximum-Entropy Reinforcement Learning* in *Proceedings of the 7th International Conference on Optimization and Learning* (eds Dorronsoro, B., Chicano, F., Danoy, G. & Talbi, E.-G.) (May 2024).

Working papers

W1. **Hosseinkhan Boucher, Rémy**, Monsel, T., Semeraro, O. & Mathelin, L. *Continuous-Time Reinforcement Learning: Modeling Delayed Dynamics with Neural Delay Differential Equations* 2025.

Presentations

Talks

T1. **Hosseinkhan Boucher, Rémy**. *Challenges in Learning Based Control for Dynamical Systems: Maximum Entropy and Mutual Information* Inria TAU Seminar Series. Feb. 2024.

T2. **Hosseinkhan Boucher, Rémy**. *Gaussian Process Regression on Vector Fields and Uncertainty Quantification* Mechanics Department Seminar, LISN, Orsay, France. 2024.

T3. **Hosseinkhan Boucher, Rémy**. *Robustness of Maximum-Entropy Reinforcement Learning* SIAM Conference on Science and Engineering. Feb. 2023.

T4. **Hosseinkhan Boucher, Rémy**. *A Reinforcement Learning Application to Chaotic Dynamical Systems* European Drag Reduction and Flow Control Meeting. Sept. 2022.

Teaching

ENS Paris-Saclay

2024 *Teaching Assistant, Advanced Deep Learning (MVA Program)*
Advanced deep learning concepts to MVA (Math Vision Apprentissage) Master's students.
Machine Learning for Physics and Computer Vision.
Principal Lecturer: G. Charpiat.

Université Paris-Saclay

2025-2026 *Teaching Assistant, Reinforcement Learning (M2 Artificial Intelligence)*
Dynamic Programming, Stochastic Approximation, and Function Approximation methods.
Supervise practical sessions and final exam.
Principal Lecturer: L. Mathelin.

2022–2023 *Teaching Assistant, C++ Programming*
Object-oriented programming (OOP) to 1st-year students.
Principal Lecturers: C. Balkanski, H. Bonneau.

CentraleSupélec

2022 *Teaching Assistant, Data Science Project Class*
Guided 2nd-year students in their data science project on adversarial robustness for deep learning classifiers.
Partnership with IRT SystemX. Principal Lecturer: W. Ouerdane.

Research Supervision

Internships

2025–26 *Joachim Jobard, École Centrale Lyon KTH Royal Institute of Technology*
Topic: Learning-based Dynamic Programming on Functional Differential Equations.
Role: Co-advisor with L. Mathelin and O. Semeraro.

2025 *Eliott Pradeleix, École Polytechnique*
Topic: Learning Functional Differential Equations with Signature-based Encoders.
Led to a publication in the Proceedings of Machine Learning Research (PMLR).
Role: Co-advisor with A. Shilova, L. Mathelin and O. Semeraro.

2023 *Stella Douka, Université Paris-Saclay, M.Sc. in Artificial Intelligence*
Topic: Gaussian Process based Model Predictive Control with Mutual Information criterion.
Led to a publication in the Proceedings of Machine Learning Research (PMLR).
Role: Co-advisor with L. Mathelin and O. Semeraro

Academic Service

Peer Review

2025 International Conference on Machine Learning (ICML)
2024 Journal of Fluid Mechanics (JFM)
2024 European Workshop on Reinforcement Learning (EWRL)
2023 IEEE Transactions on Automatic Control (TAC)

Tools & Software

Library

`control_dde`: Learning-based control for delay-differential systems.

Skills

Programming: Python, C++, R, Java, Scala, Bash

Tools: Git, Docker, Singularity, MLFlow, Hydra, Slurm

Frameworks: TensorFlow, PyTorch, Spark, Hadoop

Other: LaTeX, Markdown, Jupyter

Other Experience

2015 **Europ Assistance**

Assistance Agent

Processed customer calls based on individual insurance contracts.
Managed correction and tracking of cases until closure, transmitting data to partners.

2014 **Hilton**

Room Attendant at Day's Inn

Worked in Florida for 3 months as a housekeeper and breakfast waiter, enhancing English proficiency and adapting to new cultures (Visa J1).

Last updated: December 9, 2025