Pierre-Cyril Aubin-Frankowski

Associate professor
Born: 17/08/1994
French (native speaker), English, Italian (fluent)
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Areas of expertise. Optimization, Machine learning, Control theory.
Specialist knowledge. Kernel methods, Functional analysis, Optimal control, State constraints, Infinite-dimensional convex optimization.

Positions and Education

Dec 2024 - **Researcher/Associate professor**, *CERMICS, ENPC*, Marne-la-Vallée

Sept 2023 - Nov 2024 **Post-doctoral researcher**, *TU Wien, VADOR*, Vienna
Optimization beyond metric spaces with A. Daniilidis

Sept 2021 - Aug 2023 **Post-doctoral researcher**, *INRIA SIERRA*, Paris
Kernel methods for constrained optimization problems with A. Rudi

Sept 2018 - Aug 2021 **PhD in Applied Mathematics**, *with N. Petit, MINES ParisTech*, Paris
Estimation and Control under Constraints through Kernel Methods

Sept 2017 - Aug 2018 **Master of Public Policy**, *AgroParisTech and ENPC*, Paris
Banking and macroeconomics, Law, Environmental dialogue
Report on AI for the scientific and technical agencies of the Ministry of Environment

2016 - 2017 **Master of Science (M2)**, *MVA (Mathematics-Vision-Learning), ENS Paris-Saclay*, Cachan, **Machine Learning and Big Data - Highest honors**
Specialized in convex optimization and kernel methods

Mars 2017- Aug. 2017 **MS internship**, *with J-P. Vert, CBIO, Ecole des Mines*
Gene regulation inference from single-cell RNA sequencing

2013 - 2016 **Master of Science/Engineering diploma**, **Cycle ingénieur polytechnicien**, *École polytechnique*, Palaiseau
Major: Applied Mathematics Minor: Quantum Physics and (Neuro)biology

2011 - 2013 **Bachelor of Science**, *Lycée Louis-le-Grand*, Paris
Classe préparatoire MPI Mathematics, Physics, Computer sciences

Journal articles

All the documents (video, pdf and slides) are available at `https://pcaubin.github.io/`. When the text is already online, just click on the title to access it.

[1] (Under review) PCAF, Giacomo Enrico Sodini, Ulisse Stefanelli, *Evolution variational inequalities with general costs*, 2025

[2] (Under review) PCAF and Stéphane Gaubert, *Order isomorphisms of sup-stable function spaces: continuous, Lipschitz, c-convex, and beyond*, 2024

[3] (Under review) PCAF, Yohann De Castro, Axel Parmentier, Alessandro Rudi, *Generalization Bounds of Surrogate Policies for Combinatorial Optimization Problems*, 2024

[4] (Under review) PCAF and Alain Bensoussan, *Reproducing kernel approach to linear quadratic mean field control problems*, 2023

[5] (Under review) Flavien Léger and PCAF, *Gradient descent with a general cost*, 2023

[6] Pure and Applied Functional Analysis PCAF and Alain Bensoussan, *The reproducing kernel Hilbert spaces underlying linear SDE Estimation, Kalman filtering and their relation to optimal control*, 2024

[7] Optimization — PCAF and Alessandro Rudi, *Approximation of optimization problems with constraints through kernel Sum-Of-Squares*, 2024

[8] International Game Theory Review — Aubin, Jean-Pierre, PCAF and Vladimir Lozève, *Reintroducing Time, Money and Constraints: Viability to bridge the economic and monetary theories*, 2024

[9] Integral Equations and Operator Theory — PCAF and Stéphane Gaubert, *Tropical reproducing kernels and optimization*, 2024

[10] Communications in Optimization Theory — PCAF, Alain Bensoussan and Joe Qin, *Alternating minimization for simultaneous estimation of a latent variable and identification of a linear continuous-time dynamic system*, 2023

[11] JMLR — PCAF and Zoltán Szabó, *Handling Hard Affine Shape Constraints in RKHSs*, 2022

[12] SIAM J. on Control and Optimization — PCAF, *Linearly-constrained Linear Quadratic Regulator from the viewpoint of kernel methods*, 59(4) 2693–2716 2021

[13] Comptes Rendus. Mathématique — PCAF, *Interpreting the dual Riccati equation through the LQ reproducing kernel*, 359(2) 199–204, 2021

[14] Bioinformatics — PCAF and Jean-Philippe Vert, *Gene regulation inference from single-cell RNA-seq data with linear differential equations and velocity inference*, 36(18), 4774–4780, 2020

[15] Systems & Control Letters — PCAF, *Lipschitz regularity of the minimum time function of differential inclusions with state constraints*, 139 104677, 2020

Conference proceedings

[1] NeurIPS 2024 (spotlight) — Clément Bonet, Théo Uscidda, Adam David, PCAF, Anna Korba, *Mirror and Preconditioned Gradient Descent in Wasserstein Space*, 2024

[2] IEEE CDC 2024 — PCAF and Alain Bensoussan, *Reproducing Kernel Approach to Linear-Quadratic Mean Field Control Problems with Additive Noise*, 2024

[3] NeurIPS 2022 — PCAF, Anna Korba, Flavien Léger, *Mirror Descent with Relative Smoothness in Measure Spaces, with application to Sinkhorn and EM*, May 2022

[4] IEEE CDC 2022 — PCAF and Alain Bensoussan, *Operator-valued Kernels and Control of Infinite dimensional Dynamic Systems*, 2022

[5] IFAC CAO 2022 — PCAF, *Stability of solutions for controlled nonlinear systems under perturbation of state constraints*, 2022

[6] ICML 2021 (long oral) — Anna Korba, PCAF, Szymon Majewski and Pierre Ablin, *Kernel Stein Discrepancy Descent*, 139 5719–5730, 2021

[7] NeurIPS 2020 — PCAF and Zoltán Szabó, *Hard Shape-Constrained Kernel Machines*, 33 384–395, 2020

[8] IFAC WC 2020 — PCAF, Nicolas Petit and Zoltán Szabó, *Kernel Regression for Trajectory Reconstruction of Vehicles under Speed and Inter-Vehicular Distance Constraints*, 53(2) 15084–15089, 2020

[9] ECC 2020 — PCAF and Nicolas Petit, *Data-driven approximation of differential inclusions and application to detection of transportation modes*, 1358-1364, 2020

Awards

I received the Prix Dodu at SMAI-MODE 2024, and the best post-doc presentation at Lifting Inference with Kernel Embeddings 2022. I got a 5k€ prize as team leader of the best project at hackhaton #DataEnergie 2017.

Teaching experience

- 2025-: Lecturer of the "Decision in Uncertainty" course for advanced undergraduate studies at ENPC (Markov chains, Bellman equations)
- 2019-2021: Teaching assistant in optimization for advanced undergraduate studies at Mines Paris – PSL
- 2013-2014: Full-time science teacher (maths/physics) in senior high school in the underprivileged outskirts of Paris with Association Tremplin as part of the mandatory civic service of Ecole polytechnique

Other: Students, Reviewer duties, Invited talks

I have supervised three Master of Science interns: Adrien Chkirate (ENSAE), El Mahdi Khribch (Mines ParisTech), Yuxi Xie (ENSTA). I served as a referee for OJMO, SIMA, IEEE CSM, JOTA, SIMODS, SIREV, Bernoulli, JMLR, AMOP, JCOMP, TAC (journals) ICML, AISTATS, NeurIPS, ECC, ACC and CDC (conferences). I have been invited at over 20 national and international conferences, such as MeRiOT 2024 in Varenna, One World Optimization Seminar at ESI Wien 2024, the Viennese Conference on Optimal Control and Dynamic Games (ORCOS-VC22), the European Conference on Operational Research (EURO-ESPOO), the French-German-Portugese conference on optimization (FGP22), SIAM Conference on Control and Its Applications (CT21), and more.