Matthieu Darcy

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EDUCATION

Caltech Pasadena, California
Ph.D. student in the Computing and Mathematical Sciences department. 2021–present
Advisor: Prof. Houman Owhadi.
External affiliation: NASA Jet Propulsion Lab - Research Affiliate.

ENS Paris-Saclay - Institut Polytechnique de Paris Paris, France
Mathématiques Vision et Apprentissage, with Highest Honors. 2020–2021

Imperial College London London, United Kingdom
MSc Applied Mathematics, with Distinction. 2019–2020

King's College London London, United Kingdom
BA Mathematics and Philosophy, first class. 2016–2019

EXPERIENCE

Johnson & Johnson (Janssen Pharmaceuticals) - Machine learning consultant. 05/23 - 03/24
Machine learning and mathematical modeling of disease progression.

- Developed a dynamical systems approach for the prediction and assimilation of Alzheimer's disease progression.
- Paper forthcoming.

French Commission for Atomic Energy (CEA) - Research intern. 05/2021-08/2021
Thesis: *Deep learning for hexahedral meshing.*

- Applied a convolutional neural network approach to the automatic generation of high-quality meshes for the simulation of physical systems.

Imperial College London - Research project. 05/2020-09/2020
Application of Kernel Flows to regression.

- Developed python code for the Kernel Flows algorithm and its applications.

TECHNICAL SKILLS

- **Programming:** Python (proficient), Julia (intermediate), LaTex (proficient).
- **Packages:** Extensive experience in Numpy, Pytorch, Sklearn, Scipy, Jax, Pandas. Familiar with TensorFlow.
- **Statistical Tools:** Extensive experience in Gaussian Processes and Kernel methods, proficient in neural networks, statistics and machine learning.

RESEARCH INTERESTS

I am broadly interested in scientific machine learning, specifically in the applications of Gaussian processes, kernel methods, and wavelets to the inference and predictions of stochastic (partial) differential equations and dynamical systems.

- **Stochastic (Partial) Differential Equations**: inference and prediction of stochastic (partial) differential equations.
- **Operator Learning**: learning non-linear operators using kernel methods, with applications to PDEs and integro-functional equations.
- **Dynamical Systems**: learning and predicting dynamical systems from data.
- **Generative modeling**: multiscale approaches to generative models for partial differential equations.

Publications and Preprints

[1] R. Baptista, E. Calvello, M. Darcy, H. Owhadi, A. M. Stuart, and X. Yang, *Solving roughly forced nonlinear pdes via misspecified kernel methods and neural networks*, 2025. arXiv: 2501.17110.

[2] P. Batlle, M. Darcy, B. Hosseini, and H. Owhadi, "Kernel methods are competitive for operator learning", *Journal of Computational Physics*, vol. 496, p. 112 549, 2024, ISSN: 0021-9991.

[3] M. Darcy, B. Hamzi, G. Livieri, H. Owhadi, and P. Tavallali, "One-shot learning of stochastic differential equations with data adapted kernels", *Physica D: Nonlinear Phenomena*, vol. 444, p. 133 583, 2023.

[4] M. Darcy, B. Hamzi, J. Susiluoto, A. Braverman, and H. Owhadi, *Learning dynamical systems from data: A simple cross-validation perspective, part ii: Nonparametric kernel flows*, Dec. 2021.

Teaching and Outreach

- **SIAM chapter - Vice-President** 2023
  Organization of student talks and seminars.
- **Teaching Assistant** for graduate-level courses at Caltech 2023
  ACM 118: Stochastic Processes and Regression, 2023.
- **Refresher course lecturer** for incoming graduate students at Caltech 2022
  Developed and taught a course reviewing linear algebra and functional analysis.

Languages

- **English:** native.
- **French:** native.