

GUILLAUME STEIMER



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EDUCATION

2021 – 2025	PhD in Applied Mathematics Model order reduction method for Hamiltonian dynamics using deep learning Development of non-linear model order reduction methods preserving the symplectic structure of the full order model (Saint-Venant, Vlasov-Poisson...) using machine learning (deep learning, autoencoder, Hamiltonian neural network...)	University of Strasbourg
2019 – 2021	Master's in Mathematics and Applications Scientific Computation and Mathematics of Innovation (CSMI) track Modeling, simulation, optimization, scientific computing, machine learning, PDEs, graphs, signal processing, compilation, high-performance computing, uncertainties quantification, networks. <i>Graduated with honors (très bien)</i>	University of Strasbourg
2018 – 2019	Bachelor's in Mathematics Applied Mathematics track <i>Graduated with honors (très bien)</i>	University of Strasbourg
2016 – 2018	DEUG (2 years of BSc) in Mathematics Advanced Mathematics and Physics (MPA) track <i>Graduated with honors (très bien), class major</i>	University of Strasbourg

PUBLICATION & PREPRINT

Reduced Particle in Cell method for the Vlasov-Poisson system using auto-encoder and Hamiltonian neural networks

R. Côte , E. Franck , L. Navoret , G. Steimer, V. Vigon.

Submitted

Hamiltonian reduction using a convolutional auto-encoder coupled to an Hamiltonian neural network

R. Côte , E. Franck , L. Navoret , G. Steimer, V. Vigon.

10.4208/cicp.OA-2023-0300

Commun. in Comput. Phys., 2025

Hyperbolic reduced model for Vlasov-Poisson equation with Fokker-Planck collision

E. Franck, I. Lannabi,, Y. Nasseri, L. Navoret, G. Parasiliti Rantone, G. Steimer.

doi:10.1051/proc/202477213

ESAIM Proc. Surveys, 2024

TEACHING

2024-2025	Algebra (BSc 1st year in Mathematics) Basics of Matrix calculations and arithmetic on \mathbb{Z} . 35h of lectures per year.	University of Strasbourg
2024-2025	Scientific Computing (BSc 2nd year in Mathematics) Fundamentals of numerical analysis, applications in Python. 18h of directed studies per year.	University of Strasbourg
2024-2025	Computer Science (BSc 2nd year in Mathematics) Basics of object-oriented programming in Python. 14h of lectures and 14h of practical sessions per year.	University of Strasbourg
2021-2024	Computer Science (BSc 3rd year in applied mathematics) Object-oriented programming in C++. 34h of directed studies per year.	University of Strasbourg
2021-2023	Computer Science (BSc 2nd year in Mathematics) Basics of object-oriented programming in Python. 30h of practical sessions per year.	University of Strasbourg

INTERNATIONAL CONFERENCES

June 2025	4th International Nonlinear Dynamics Conference (NODYCON 2025) Reduced Particle in Cell method for the Vlasov-Poisson system using auto-encoder and Hamiltonian neural networks E. Franck, L. Navoret, G. Steimer, V. Vigon	New-York, USA
February 2025	3rd IACM Digital Twins in Engineering Conference & 1st ECCOMAS Artificial Intelligence and Computational Methods in Applied Science (DTE & AICOMAS) Reduced Particle in Cell method for the Vlasov-Poisson system using auto-encoder and Hamiltonian neural networks E. Franck, L. Navoret, G. Steimer, V. Vigon	Paris, France
May 2023	Math 2 Product (M2P) : Emerging Technologies in Computational Science for Industry, Sustainability and Innovation Reduced order modeling using auto-encoder and Hamiltonian neural networks E. Franck, L. Navoret, G. Steimer, V. Vigon	Taormina, Italy
November 2022	Numerical Methods for the Kinetic Equations of Plasma Physics (NumKin) Data driven reduced modeling of the Vlasov-Poisson equation E. Franck, L. Navoret, G. Steimer, V. Vigon	Garching, Germany
September 2022	Model Reduction and Surrogate Modeling (MORE) Data driven reduced modeling of the Vlasov-Poisson equation E. Franck, L. Navoret, G. Steimer, V. Vigon	Berlin, Germany
June 2022	8th European Congress on Computational Methods in Applied Sciences and Engineering (EC-COMAS) Data driven reduced modeling of the Vlasov-Poisson equation E. Franck, N. Crouseilles, L. Navoret, G. Steimer, V. Vigon	Oslo, Norway

INTERNSHIPS & PROJECTS

2/2021 – 8/2021	Master's 2nd year internship: data-driven reduction of the Vlasov-Poisson model INRIA TONUS team, IRMA, Strasbourg Study of the Vlasov-Poisson equation, simulation using PIC method, construction of reduced models via Singular Value Decomposition (SVD), autoencoder, and learning the dynamics with Hamiltonian neural networks.
10/2020 – 1/2021	Master's 2nd year project: learning the Hamiltonian dynamics of a physical system with neural networks MOCO team, IRMA, Strasbourg Implementation of neural networks capable of learning the dynamics of simple physical systems using Hamiltonian mechanics, where "classical" networks fail. Applications to conservative physical systems.
3/2020 – 8/2020	Master's 1st year project and internship: tsunami modeling, the contribution of neural networks compared to classical numerical schemes MOCO team, IRMA, Strasbourg Development of a tsunami prediction method for the Mediterranean Sea: writing a 1D simulation code in C++ with real topographies, followed by the design of various deep learning neural networks to predict tsunami arrival times.
Spring 2020	Project: homicide report, can we predict a murderer's traits? University of Strasbourg Descriptive statistics and machine learning work for predicting a murderer's characteristics based on the murder and victim characteristics with the Homicide Report database from Kaggle, which lists all homicides in the United States from 1980 to 2014, collected by the FBI. Done in collaboration with P. Bernard.

SPECIFIC SKILLS

- Mathematics:** Numerical analysis, scientific computing, model reduction, Hamiltonian systems, algorithms, numerical methods for ODEs/PDEs, scientific machine learning, optimization, stochastic models, high-performance computing.
- Languages & librairies:** C, C++, Python, Tensorflow, Scikitlearn, Keras, MPI, openMP, CUDA, Openturns, Pandas, git.
- Languages:** English (fluent), Norwegian (bokmål, beginner)