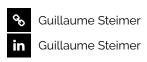
GUILLAUME STEIMER





EDUCATION

2021 – 2025 PhD in Applied Mathematics University of Strasbourg

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...)

2019 – 2021 Master's in Mathematics and Applications University of Strasbourg

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.

Graduated with honors (très bien)

2018 – 2019 Bachelor's in Mathematics University of Strasbourg

Applied Mathematics track Graduated with honors (très bien)

2016 – 2018 DEUG (2 years of BSc) in Mathematics University of Strasbourg

Advanced Mathematics and Physics (MPA) track Graduated with honors (très bien), class major

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) New-York, USA

Reduced Particle in Cell method for the Vlasov-Poisson system using auto-encoder and Hamil-

tonian neural networks

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

February 2025 3rd IACM Digital Twins in Engineering Conference & 1st ECCOMAS Artificial Intelligence and

Computational Methods in Applied Science (DTE & AICOMAS)

Paris, France

Reduced Particle in Cell method for the Vlasov-Poisson system using auto-encoder and Hamil-

tonian neural networks

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May 2023 Math 2 Product (M2P): Emerging Technologies in Computational Science for Industry, Sustain-

ability and Innovation

Taormina, Italy

Reduced order modeling using auto-encoder and Hamiltonian neural networks

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

November 2022 Numerical Methods for the Kinetic Equations of Plasma Physics (NumKin) Garching, Germany

Data driven reduced modeling of the Vlasov-Poisson equation

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

September 2022 Model Reduction and Surrogate Modeling (MORE)

Berlin, Germany

Data driven reduced modeling of the Vlasov-Poisson equation

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

June 2022 8th European Congress on Computational Methods in Applied Sciences and Engineering (EC-

1AS) Oslo, Norway

Data driven reduced modeling of the Vlasov-Poisson equation E. Franck, N. Crouseilles, L. Navoret, G. Steimer, V. Vigon

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.

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 collabo-

ration 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)