

Quentin Malé

Computational Physicist

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I develop novel computational methods for multiphysics flows, leveraging high-performance computing and machine learning to push the limits of simulation and modeling. My research unites physics, machine learning and large-scale computation to advance science and engineering in energy and complex flow systems.



RESEARCH EXPERIENCE

Harvard University Postdoctoral Fellow	Cambridge, US Jan 2025 onward
ETH Zurich Postdoctoral Researcher (2021 –2023) and Established Researcher (2024)	Zurich, CH Apr 2021–Dec 2024
European Center in Research and Advanced Training on Scientific Computing (CERFACS) PhD Student (2017 –2020) and Postdoctoral Researcher (2021)	Toulouse, FR Sep 2017–Mar 2021
The University of Melbourne Visiting PhD student	Melbourne, AU Dec 2018–Mar 2019

EDUCATION

PhD Computational Physics CERFACS Advisor: Thierry Poinot	2017-2020	MSc Energy Engineering INSA Rouen	2014-2017	MRes Energy and Fluids University of Rouen	2017
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AWARDED RESEARCH GRANTS

- [SNSF/ANR](#) Lead Agency, 516K €: “Joint experimental and numerical study of H₂ plasma-assisted combustion” 2024–2027
- 3× [CSCS](#) HPC access, 820K node-h in total (grant no. s1138, s1220 and s1262) 2022–2024
- 2× [PRACE](#) HPC access, 735K node-h in total (grant no. 2019204881 and 2021250004) 2019 & 2021
- [GENCI](#) HPC early access (Irene at [TGCC](#)) 170K node-h (grant no. gch0301) 2018

ACADEMIC SERVICES

- Research project peer review: German Research Foundation (DFG).
- Journal peer review: Flow, Turbulence and Combustion; Combustion and Flame; Proceedings of the Combustion Institute.

TEACHING AND SUPERVISION EXPERIENCE

- Teaching Assistant at Harvard, AM207, “Stochastic Methods for Data Analysis, Inference and Optimization” Fall 2025
Design of exercises and examinations; student support during office hours
- Exercise correction sessions at ETH Zurich, MSc level, “Numerical simulation of flame archetypes” Spring 2023 & 2024
Present solution to assignments and discussing the results.
- Lecture at ETH Zurich, MSc level, “Numerical simulation of turbulent reactive flows” Spring 2022 & 2023
Design and delivery of the lecture

I supervised the work of eight MSc and two BSc students (thesis and projects) on topics such as: reinforcement learning for closure modeling, massively parallel simulation of cold plasmas and turbulent reacting flows, algorithm for chemical kinetics analysis. I also actively co-supervised PhD work at ETH Zurich on HPC of complex flows, including thermoacoustics, hydrogen thermochemistry and cold plasma.

JOURNAL PUBLICATIONS

- [1] Q. Malé, C. Lapeyre, N. Noiray, “Hydrogen reaction rate modeling based on convolutional neural network for large eddy simulation”, *Data-Centric Eng.*, 2025. [URL](#).
- [2] G. Faingold, L. Krieg, F. Pagaud, Q. Malé, N. Noiray, “Nanosecond pulsed discharges for reliable ignition of ultra-lean hydrogen-air mixtures”, *Proc. Combust. Inst.*, 2025. [URL](#).
- [3] M. Impagnatiello, Q. Malé, N. Noiray, “Acoustic scattering of a sequential combustor controlled with non-equilibrium plasma: A numerical study”, *Proc. Combust. Inst.*, 2024. [URL](#).
- [4] Q. Malé, K. Pandey, N. Noiray, “The LEAF concept operated with hydrogen: Flame topology and NO_x formation”, *Proc. Combust. Inst.*, 2024. [URL](#).
- [5] Q. Malé, S. Shcherbanev, M. Impagnatiello, N. Noiray, “Stabilization of a thermoacoustically unstable sequential combustor using non-equilibrium plasma: Large eddy simulation and experiments”, *Proc. Combust. Inst.*, 2024. [URL](#).
- [6] M. Impagnatiello, Q. Malé, N. Noiray, “Numerical Study of Ignition and Combustion of Hydrogen-Enriched Methane in a Sequential Combustor”, *Flow Turbul. Combust.*, 2024. [URL](#).
- [7] Q. Malé, N. Barléon, S. Shcherbanev, B. Dharmaputra, N. Noiray, “Numerical study of nitrogen oxides chemistry during plasma assisted combustion in a sequential combustor”, *Combust. Flame*, 2024. [URL](#).
- [8] Q. Malé, S. Shcherbanev, N. Noiray, “Numerical study of plasma assisted combustion in a sequential combustor”, *Proc. Combust. Inst.*, 2023. [URL](#).
- [9] S. A. Shcherbanev, Q. Malé, B. Dharmaputra, R. Solana-Pérez, N. Noiray, “Effect of plasma-flow coupling on the ignition enhancement with non-equilibrium plasma in a sequential combustor”, *J. Phys. D: Appl. Phys.*, 2022. [URL](#).
- [10] Q. Malé, O. Vermorel, F. Ravet, T. Poinso, “Jet ignition prediction in a zero-dimensional pre-chamber engine model”, *Int. J. Engine Res.*, 2022. [URL](#).
- [11] Q. Malé, O. Vermorel, F. Ravet, T. Poinso, “Direct numerical simulations and models for hot burnt gases jet ignition”, *Combust. Flame*, 2021. [URL](#).
- [12] T. Jaravel, O. Dounia, Q. Malé, O. Vermorel, “Deflagration to detonation transition in fast flames and tracking with chemical explosive mode analysis”, *Proc. Combust. Inst.*, 2021. [URL](#).
- [13] Q. Malé, G. Staffelbach, O. Vermorel, A. Misdariis, F. Ravet, T. Poinso, “Large Eddy Simulation of Pre-Chamber Ignition in an Internal Combustion Engine”, *Flow Turbul. Combust.*, 2019. [URL](#).
- [14] J. Lamouroux, S. Richard, Q. Male, G. Staffelbach, A. Dauplain, A. Misdariis, “On the Combination of Large Eddy Simulation and Phenomenological Soot Modeling to Calculate the Smoke Index From Aero-Engines Over a Large Range of Operating Conditions”, *J. Eng. Gas Turbine Power*, 2018. [URL](#).

RESEARCH PRESENTATIONS

Invited talks:

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| ○ Machine Learning for Combustion Meeting (UK): “Enhancing LES of hydrogen reacting flows using ML” | Dec 2024 |
| ○ 7 th Int. Flame Chemistry Workshop (IT): “Integrating plasma effects into simulations [...]: status and challenges” | Jul 2024 |
| ○ Swiss Combustion Day (CH): “Multiphysics high performance computing of plasma-assisted combustion” | Feb 2024 |
| ○ GENCI early access grant feedback at TGCC (FR): “High-performance computing for innovative engine design” | Jun 2019 |

Conference presentations:

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| ○ Int. symposium on combustion (IT): “Stabilization of a thermoacoustically unstable sequential combustor [...]” | Jul 2024 |
| ○ Int. symposium on combustion (IT): “The LEAF concept operated with hydrogen [...]” | Jul 2024 |
| ○ Int. symposium on combustion (CA): “Numerical study of plasma-assisted combustion in a sequential combustor” | Jul 2022 |
| ○ Int. workshop on plasma-assisted combustion (FR): “Numerical simulations of plasma-assisted combustion [...]” | Jun 2022 |
| ○ Int. symposium on combustion (IE): “Direct numerical simulations of jet ignition” | Aug 2018 |