

# Quentin Malé

Computational Physicist, Researcher at Harvard University

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The interdisciplinary nature of computational physics enables me to grow in many different domains. I enjoy developing sophisticated simulation methods to address crucial needs in our society, and I intend to continue on this path.



## RESEARCH EXPERIENCE

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

## EDUCATION

<b>PhD Computational Reacting Flow</b> <a href="#">CERFACS</a> Advisor: Thierry Poinso	2017-2020	<b>MSc Energy Engineering</b> <a href="#">INSA Rouen</a>	2014-2017	<b>MRes Energy and Fluids</b> <a href="#">University of Rouen</a>	2017
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## AWARDED RESEARCH GRANTS

- [SNSF/ANR](#) Lead Agency, **516K €**: “Joint experimental and numerical study of H<sub>2</sub> 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

• Exercise sessions at ETH Zurich, MSc level, “Numerical simulation of flame archetypes” <i>Design of the solutions to the exercises and discussion of the results</i>	Spring 2023 & 2024
• Lecture at ETH Zurich, MSc level, “Numerical simulation of turbulent reactive flows” <i>Design and execution of the lecture</i>	Spring 2022 & 2023
• Hands-on at CAPS lab., ETH Zurich, “Large eddy simulation of reactive flows using <a href="#">AVBP</a> ” <i>Design of the materials and guidance during the tutorials/exercises</i>	Spring 2022
• Hands-on at <a href="#">CERFACS</a> , “Large eddy simulation of reactive flows using <a href="#">AVBP</a> ” <i>Guidance of the tutorials/exercises</i>	2018–2020

I supervised the work of seven MSc and two BSc students (thesis and projects) on topics such as: Massively parallel simulation of cold plasma and turbulent reacting flows; Algorithms for reaction path analysis of plasma kinetics and nitrogen oxides formation; Reduced order modeling of thermochemical systems. The work of my students has all been successfully performed as part of their studies. I also actively co-supervised PhD work at ETH Zurich on HPC of complex flows, including thermoacoustics, hydrogen thermochemistry and cold plasma.

## JOURNAL PUBLICATIONS

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- [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<sub>x</sub> 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. Dauphain, 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

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### Invited talks:

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| ○ Machine Learning for Combustion Meeting (UK): “Enhancing LES of hydrogen reacting flows using ML”   | Dec 2024 |
| ○ 7 <sup>th</sup> 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 |
| ○ <a href="#">GENCI</a> early access grant feedback at <a href="#">TGCC</a> (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 |