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

EDUCATION

PhD Computational Reacting Flow		**MSc Energy Engineering**		**MRes Energy and Fluids**	
CERFACS	2017-2020	INSA Rouen	2014-2017	University of Rouen	2017
Advisor: Thierry Poinsot					

AWARDED RESEARCH GRANTS

- SNSF/ANR Lead Agency, **516K €**: "Joint experimental and numerical study of H_2 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" Spring 2023 & 2024
  Design of the solutions to the exercises and discussion of the results
- Lecture at ETH Zurich, MSc level, "Numerical simulation of turbulent reactive flows" Spring 2022 & 2023
  Design and execution of the lecture
- Hands-on at CAPS lab., ETH Zurich, "Large eddy simulation of reactive flows using AVBP" Spring 2022
  Design of the materials and guidance during the tutorials/exercises
- Hands-on at CERFACS, "Large eddy simulation of reactive flows using AVBP" 2018–2020
  Guidance of the tutorials/exercises

I supervised the work of six 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

[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] 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.

[3] Q. Malé, K. Pandey, N. Noiray, "The LEAF concept operated with hydrogen: Flame topology and NOx formation", *Proc. Combust. Inst.*, 2024. URL.

[4] 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.

[5] 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.

[6] 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.

[7] Q. Malé, S. Shcherbanev, N. Noiray, "Numerical study of plasma assisted combustion in a sequential combustor", *Proc. Combust. Inst.*, 2023. URL.

[8] 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.

[9] Q. Malé, O. Vermorel, F. Ravet, T. Poinsot, "Jet ignition prediction in a zero-dimensional pre-chamber engine model", *Int. J. Engine Res.*, 2022. URL.

[10] Q. Malé, O. Vermorel, F. Ravet, T. Poinsot, "Direct numerical simulations and models for hot burnt gases jet ignition", *Combust. Flame*, 2021. URL.

[11] 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.

[12] Q. Malé, G. Staffelbach, O. Vermorel, A. Misdariis, F. Ravet, T. Poinsot, "Large Eddy Simulation of Pre-Chamber Ignition in an Internal Combustion Engine", *Flow Turbul. Combust.*, 2019. URL.

[13] J. Lamouroux, S. Richard, Q. Male, G. Staffelbach, A. Dauptain, 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:

○ Machine Learning for Combustion Meeting (UK): "Enhancing LES of hydrogen reacting flows using ML"   Dec 2024

○ 7th 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:

○ 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