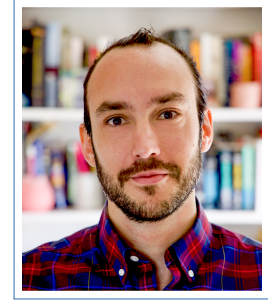# Lucas Esclapez

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Work experience

August 2023 -
Research Software Engineer, *Netherlands eScience Center*, Amsterdam, The Netherlands
- ○ Developing scientific software in collaboration with researchers from various domains
- ○ Accelerating weather simulations with OpenACC, rare event algorithms on HPC platform

July 2021 -
June 2023
Project Scientist, *High Performance Algorithms and Complex Fluids*, NREL, Golden, USA
- ○ Main developer of the open-source AMR combustion codes PeleLM and PeleLMeX
- ○ Bringing Pele codes to ExaScale platforms
- ○ Numerical study of combustion physics including hydrogen combustion, sustainable aviation fuels and plasma-assisted combustion

May 2020 -
June 2021
Project Scientist, *Center for Computational Sciences and Engineering*, LBNL, Berkeley, USA
- ○ Porting the open-source AMR combustion code PeleLM to GPU
- ○ Development of numerical method for plasma/combustion interactions

June 2018 -
April 2020
Post-doctoral researcher, *Center for Computational Sciences and Engineering*, LBNL, Berkeley, USA
- ○ Development of numerical methods for combustion application
- ○ Simulations of the flames/electric fields interactions

October 2016 -
May 2018
Post-doctoral researcher, *CERFACS*, Toulouse, France
- ○ LES of multiphase reactive flows
- ○ Development of LES multi-scale approach for large scale industrial devices
- ○ LES of transcritical LCH4/LOx flames

June 2015 -
Sept. 2016
Post-doctoral researcher, *Center for Turbulence Research*, Stanford, USA
- ○ LES of gas turbines ignition/extinction
- ○ Multiphase and multicomponents reactive flows

Education

2012 - 2015
Ph.D., *Institut National Polytechnique*, Toulouse, France
Ph.D. in Fluid Dynamics. Supervisors: B. Cuenot, E. Riber
Numerical investigation of ignition and flame propagation in aeronautical gas turbines.

2011 - 2011
MSc. Research, *Institut National des Sciences Appliquées*, Toulouse, France
MSc. Research in Energetics and Transfers

2006 - 2011
MSc., *Institut National des Sciences Appliquées*, Toulouse, France
MSc. in Mechanical Engineering

Skills and competences

Language:
- French (mother tongue)
- English (proficient user)
- Dutch (beginner)

Computer science:
- Office Suite, LaTeX
- C++, Fortran, MPI/OpenMP, Shell, Git, Python, OpenACC
- Ensight, Paraview

Technical competences:

- High Performance Computing (HPC): developing and implementing numerical methods in highly parallel environment

- LES/DNS: performing and analyzing high fidelity fluid computations

Selected Publications

2025   C. J. Balos, M. Day, <u>L. Esclapez</u>, A. M. Felden, D. J. Gardner, M. Hassanaly, D. R. Reynolds *et al.* SUNDIALS time integrators for Exascale applications with many independent systems of ordinary differential equations, *The International Journal of High Performance Computing Applications 39, no. 1 (2025): 123-146.*

2024   M. de Frahan, <u>L. Esclapez</u>, J. Rood, N. T. Wimer, *et al.* The Pele simulation suite for reacting flows at exascale, *Proceedings of the 2024 SIAM Conference on Parallel Processing for Scientific Computing (PP).*

   L. D. Owen, W. Ge, M. Reith, M. Arienti, <u>L. Esclapez</u>, B. Soriano, *et al.* PeleMP: The multiphysics solver for the combustion Pele adaptive mesh refinement code suite, *ASME. J. Fluids Eng. April 2024; 146(4): 041103.*

   M. Hassanaly, N. T. Wimer, A. Felden, <u>L. Esclapez</u>, J. Ream, M. H. de Frahan, M. Day. Symbolic construction of the chemical Jacobian of quasi-steady state (QSS) chemistries for Exascale computing platforms, *Combustion and Flame, 270, 113740.*

2023   <u>L. Esclapez</u>, M. Day, J. Bell, A Felden *et al.* PeleLMeX: an AMR low Mach number reactive flow simulation code without level sub-cycling, *Journal of Open Source Software.*

   P. Bauman, R. Budiardja, D. Bykov, N, Chalmers, J. Chen, N. Curtis, M. Day, M. Eisenbach, <u>L. Esclapez</u> *et al..* Experiences Readying Applications for Exascale *Super Computing 2023.*

2022   N. Deak, A Duarte, <u>L. Esclapez</u>, M. Day and F. Bisetti. High-fidelity simulations of plasma-assisted oxidation of hydrocarbon fuels using nanosecond pulsed discharges *AIAA SciTech.*

2021   <u>L. Esclapez</u>, F. Collin-Bastiani, E. Riber and B. Cuenot. A statistical model to predict ignition probability. *Combustion and Flame*, 225, 180-195, 2021. [↗].

2020   D. Paulhiac, B. Cuenot, E. Riber, <u>L. Esclapez</u>, S. Richard. Analysis of the spray flame structure in a lab-scale burner using Large Eddy Simulation and Discrete Particle Simulation. *Combustion and Flame*, 212, 25-38, 2020. [↗].

2019   <u>L. Esclapez</u>, V. Ricchiuti, J. Bell and M. Day. A numerical strategy for low Mach number reactive flows subject to electric fields. *Combustion Theory and Modeling*, 2019. [↗]

   A. Felden, P. Pepiot, <u>L. Esclapez</u>, E. Riber and B. Cuenot. Including analytically reduced chemistry (ARC) in CFD applications. *Acta Astronautica*, 158, 444-459, 2019. [↗]

   C. Laurent, <u>L. Esclapez</u>, D. Maestro, G. Staffelbach, B. Cuenot, L. Selle, T. Schmitt, F. Duchaine, T. Poinsot. Flame-wall interaction effects on the flame root stabilization mechanisms of a doubly-transcritical LO2/LCH4 cryogenic flame. *Proceedings of the Combustion Institute*, 37, 5147-5154, 2019. [↗]

2018   A. Felden, <u>L. Esclapez</u>, E. Riber, B. Cuenot, H. Wang. Including real fuel chemistry in LES of turbulent spray combustion *Combustion and Flame*, 193, 397-416, 2018. [↗]

2017   <u>L. Esclapez</u>, P.C. Ma, E. Mayhew, R. Xu, S. Stouffer, T. Lee, H. Wang, M. Ihme. Fuel effect on lean blow-out in a realistic gas turbine combustor. *Combustion and Flame*, 181, 82-99, 2017. [↗]

2016   A. Stagni, L. Esclapez, P. Govindaraju, A. Cuoci, T. Favarelli, M. Ihme. The role of preferential evaporation on the ignition of multicomponent fuels in a homogeneous spray/air mixture. *Proceeding of the Combustion Institute*, 36, 2483-2491, 2017. ↗

2015   M. Bauerheim, T. Jaravel, L. Esclapez, S. Bourgeois, M. Rullaud, M. Cazalens, E. Riber, L.Y.M. Gicquel ad B. Cuenot. Multiphase Flow Large-Eddy Simulation Study of the Fuel Split Effects on Combustion Instabilities in an Ultra-Low-NOx Annular Combustor. *Journal of Engineering for Gas Turbines and Power*, 2015. ↗

       L. Esclapez, E. Riber and B. Cuenot, Ignition probability of a partially premixed burner using LES. *Proceedings of the Combustion Institute* , 35, 3133-3141, 2015. ↗

2014   D. Barré, L. Esclapez, M. Cordier, E. Riber, B. Cuenot, G. Staffelbach, B. Renou, A. Vandel, L.Y.M Gicquel and G. Cabot, Flame propagation in aeronautical swirled multi-burners: Experimental and numerical investigation. *Combustion and Flame*, 2014. ↗

Fellowship and honors

NREL Employee of the Month, 09/2022

ATPESC, Argonne National Lab. 2019

Center for Turbulence Research Postdoctoral Fellowship 2015

Prix L. Escande 2015 for the best thesis of the INP Toulouse

Award of Excellence in the FP7 European project LEMCOTEC

SAFRAN Group CIFRE Ph.D. Grant (2012-2015)

References

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