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Pierre Bénard

Contents

Personal Information

Pierre Bénard
Assistant professor @ INSA Rouen Normandie & CORIA lab

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Research Gate Profile

Lab Address

CORIA
Avenue de l'Université - BP 12
76801 Saint Etienne du Rouvray
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Research activities

- Wind turbine wakes modeling
- Turbulent premixed combustion modeling
- Large-Eddy Simulation in complex geometries: airfoils, wind turbines, gas turbines
- Numerical methods for massively parallel super-computers

- Development of the YALES2 solver, a high-order unstructured code for massively parallel computations of two-phase reactive flows

Teaching Activities

- 2018-today: CFD/OpenFOAM, Turbulence, Combustion, Energetics, Parallel Computing @ INSA Rouen
- 2014-today: Formation to YALES2 code usage
- 2016: Teaching assistant, département Génie Thermique et Energie @ IUT Rouen (40h).
- 2015: Combustion modeling expert mission @ GDTech France, Pau (4 weeks)
- 2012 - 2013: Teaching assistant, STPI department @ INSA Rouen, (Mecanics) (64h)

Students Supervising

Postdocs

- Etienne Muller, 2021-2022
- Simone Gremmo, 2020-2022
- Aqeel Ahmed, 2020 (5 months)

Ph.D

- Khaled Abdelaziz, 2023-2026 (with Nicolas Mazellier @PRISME and Cédric Raibaudo @PRISME)
- Hari Mulakaloori, 2022-2025 (with Vincent Moureau)
- Anand Parinam, 2021-2025 (with Axelle Viré @TUDelft, Dominic von Terzi @TUDelft and Vincent Moureau)
- Ulysse Vigny, 2020-2025 (with Stéphanie Zeoli @UMONS and Vincent Moureau)
- Iason Tsetoglou, 2019-2022 (with Vincent Moureau and Julien Réveillon)
- Félix Houtin-Mongrolle, 2018-2021 (with Vincent Moureau and Julien Réveillon)
- Thomas Fabbri, 2018-2021 (with Guillaume Balarac and Vincent Moureau)

Interns

- Xavier Noël, M1, 2025 (3 months)
- Camille Laval, M1, 2025 (3 months)
- Sidney Ferreira Vasconcelos, M2, 2022 (6 months)
- Guillaume Janodet, M2, 2021 (6 months) (co-supervising with V. Moureau et G. Lartigue)
- Mickaël Theot, M1, 2021 (4 months) (50% with Léa Voivenel)
- Hugo Wolf, M1, 2021 (3 months)
- Swan Le Dreau, M1, 2021 (3 months)
- Ulysse Vigny, M2, 2020 (6 months)
- Samuel Pineda, M1, 2020 (3 months)
- Ludovic Plumain, M1, 2019 (3 months)
- Guillaume Janodet, L3, 2019 (3 months)
- Thomas Fabbri, M2, 2018 (6 months)
- Marwane Dherbécourt, M1, 2018 (3 months)
- Lilian Le Bras, M1, 2017 (2 months)
- Patricia Domingo, M2, 2016 (6 months) (50% with Vincent Moureau)
- Lancelot Boulet, M2, 2014 (6 months) (50% with Yves D'Angelo)
- Yann Dufresne, M2, 2014 (6 months) (50% with Yves D'Angelo)

Background

- 2018-today : Assistant Professor (Maître de Conférences) at INSA Rouen Normandie / CORIA, France
- 2017 : Invited Researcher at University of Mons, Belgium (2 months)
- 2015-2018 : Research Engineer, CORIA, France
- 2012-2015 : PhD thesis, CORIA, France
- 2011-2008 : M.S. Energétique et Propulsion, INSA de Rouen, France
- 2006-2008 : DUT Mesures Physiques, IUT de Caen, Université de Caen, France

Reviewing activities

Reviewer for Computers and Fluids, Physics of Fluids, Applied Energy, Wind Energy Science, Compte Rendus Mécanique, Ocean Engineering, Engineering Applications of Computational Fluid Mechanics, Mathematical Modelling of Natural Phenomena.

Publications

Peer-reviewed international journals

1. Etienne Muller, Simone Gremmo, Félix Houtin-Mongrolle, Bastien Duboc, Pierre Bénard Field-data-based validation of an aero-servo-elastic solver for high-fidelity large-eddy simulations of industrial wind turbines. Wind Energy Science, 2024, 9 (1), pp.25-48. [1]
2. Iason Tsetoglou, Mélody Cailler, Pierre Bénard, Ghislain Lartigue, Vincent Moureau, Julien Reveillon A volume-of-solid implicit volume penalty method for moving-body flows. International Journal for Numerical Methods in Fluids, 2024, [2]
3. T. Fabbri, G. Balarac, V. Moureau, P. Benard Design of a high fidelity Fluid-Structure Interaction solver using LES on unstructured grid. Computers and Fluids, 2023, 265, pp.105963. [3]
4. A. Grenouilloux, J. Leparoux, V. Moureau, G. Balarac, T. Berthelon, R. Mercier, M. Bernard, P. Bénard, et al. Toward the use of LES for industrial complex geometries. Part I: automatic mesh definition. Journal of Turbulence, 2023, 6-7, pp.280-310. [4]
5. Guillaume Balarac, Francesca Basile, Pierre Bénard, Felipe Bordeu, Jean-Baptiste Chapelier, et al. Tetrahedral Remeshing in the Context of Large-Scale Numerical Simulation and High Performance Computing. MathematicS In Action, 2022, 11 (1), pp.129-164. [5]
6. Romain Janodet, Carlos Guillamón, Vincent Moureau, Renaud Mercier, Ghislain Lartigue, Pierre Benard, et al. A massively parallel accurate conservative level set algorithm for simulating turbulent atomization on adaptive unstructured grids. Journal of Computational Physics, 2022, 458, [6]
7. Marie Cordier, Pierre Bénard, Paul Lybaert, Ward de Paepe, Laurent Bricteux On the Need for Turbulence Chemistry Interaction Modelling in Highly Resolved Large-Eddy Simulations of Mild Combustion. Flow, Turbulence and Combustion, 2022, 108 (2), pp.509-538. [7]
8. Alessio Pappa, Laurent Bricteux, Pierre Bénard, Ward de Paepe Can Water Dilution Avoid Flashback on a Hydrogen-Enriched Micro-Gas Turbine Combustion? - A Large Eddy Simulations Study. Journal of Engineering for Gas Turbines and Power, 2021, 143 (4), pp.041008. [8]
9. Félix Houtin-Mongrolle, Pierre Bénard, Ghislain Lartigue, Vincent Moureau A level-set framework for the wind turbine wake analysis: from high-fidelity unsteady simulations to 1D momentum theory. Journal of Physics: Conference Series, 2021, 1934 (1), pp.012011. [9]
10. Houtin-Mongrolle, F., Bricteux, L., Benard, P., Lartigue, G., Moureau, V. & Reveillon, J. (2020) Actuator line method applied to grid turbulence generation for large-Eddy simulations. *Journal of Turbulence* [10].
11. Domingo-Alvarez, P., Benard, P., Moureau, V., Grisch, F. & Lartigue, G. (2019) Impact of Spray Droplet Distribution on the Performances of a Kerosene Lean/Premixed Injector. *Flow, Turbulence and Combustion* [11].

12. Benard, P., Lartigue, G., Moureau, V. & Mercier, R. (2018) Large-Eddy Simulation of the lean-premixed PRECCINSTA burner with wall heat loss. *Proceedings of the Combustion Institute* [12].
13. Boulet, L., Benard, P., Lartigue, G., Moureau, V., Didorally, S., Chauvet, N. & Duchaine, F. (2018) Modeling of conjugate heat transfer in a kerosene/air spray flame used for aeronautical fire resistance tests. *Flow, Turbulence and Combustion*. [13]
14. Benard, P., Viré, A., Moureau, V., Lartigue, G., Beaudet, L., Deglaire, P. & Bricteux, L. (2018) Large-Eddy Simulation of wind turbines wakes including geometrical effects. *Computers & Fluids* [14].
15. Benard, P., Moureau, C., Lartigue, G. & D'Angelo, Y. (2017) Large-Eddy Simulation of a hydrogen enriched methane/air meso-scale combustor. *International Journal of Hydrogen Energy*, 81: 719?740, [15].
16. Benard, P., Balarac, G., Moureau, V., Dobrzynski, C., Lartigue, G. & D'Angelo, Y. (2015) Mesh adaptation for large-eddy simulations in complex geometries. *International Journal for Numerical Methods in Fluids*, 42(4): 2397-2410, [16].

International conferences

1. Anand Parinam, Pierre Bénard, Dominic Von Terzi, Axelle Viré Large-Eddy Simulations of wind turbine wakes in sheared inflows. Wake 2023, Jun 2023, Visby, Sweden. pp.012039
2. Pierre Bénard, Bastien Duboc, Stéphanie Zeoli, Laurent Bricteux, Félix Houtin-Mongrolle, et al. Wind turbine wake analysis and investigation of rotor-wake interactions using high fidelity simulation. EuroHPC Summit Week, Mar 2022, Paris, France.
3. Simone Gremmo, Etienne Muller, Félix Houtin-Mongrolle, Bastien Duboc, Pierre Bénard Rotor-wake interactions in a wind turbine row: a multi-physics investigation with large eddy simulation. TORQUE2022, Jun 2022, Delft, Netherlands.
4. Iason Tsetoglou, Mélody Cailler, Pierre Bénard, Vincent Moureau, Ghislain Lartigue, et al. A mass conserving implicit volume penalty method for moving-body flows. The 8th European Congress on Computational Methods in Applied Sciences and Engineering and ECCOMAS Congress 2022, Jun 2022, Oslo, Norway
5. Simone Gremmo, Félix Houtin-Mongrolle, Pierre Bénard, Bastien Duboc, Ghislain Lartigue, et al. Large-Eddy Simulation of Deformable Wind Turbines. WESC2021, May 2021, Hannover, Germany.
6. Iason Tsetoglou, Pierre Bénard, Ghislain Lartigue, Vincent Moureau, Julien Reveillon Evaluation of load estimation approaches for different immersed boundary methods. 14th World Congress in Computational Mechanics and ECCOMAS Congress 2020, Jan 2021, Paris, France.
7. Félix Houtin-Mongrolle, Pierre Bénard, Vincent Moureau, G. Lartigue, L. Bricteux, et al. Actuator grid method for turbulence generation applied to yawed wind turbines. TORQUE Conference 2020, Sep 2020, Delft, Netherlands. pp.062064
8. Stéphanie Zeoli, Guillaume Balarac, Pierre Bénard, Gauthier Georis, Félix Houtin-Mongrolle, et al. Large eddy simulation of wind turbine wakes using adaptative mesh refinement. TORQUE conference 2020, Sep 2020, Delft, Netherlands. pp.062056
9. Vincent Moureau, Pierre Bénard, Ghislain Lartigue, Renaud Mercier Dynamic adaptation of tetrahedral-based meshes for the simulation of turbulent premixed flames. 17th International Conference on Numerical Combustion, May 2019, Aachen, Germany
10. Pierre Bénard, Ghislain Lartigue, Vincent Moureau, Renaud Mercier Detailed kinetic scheme effect on Large-Eddy Simulations of the PRECCINSTA burner. 17th International Conference on Numerical Combustion, May 2019, Aachen, Germany
11. Pierre Bénard, Norbert Warncke Reduced-Order DWM Model based on POD Modes. Wind Energy Science Conference 2019, Jun 2019, Cork, Ireland
12. Félix Houtin-Mongrolle, Pierre Bénard, Ghislain Lartigue, Vincent Moureau, Laurent Bricteux, et al. Wake interaction of yawed wind turbine by Large-Eddy Simulation. Wind Energy Science Conference 2019, Jun 2019, Cork, Ireland. ?hal-02160379?
13. Benard, P., Lartigue, G., Moureau, V. & Mercier, R. (2019) Detailed kinetic scheme effect on Large-Eddy Simulations of the PRECCINSTA burner. *17th International Conference on Numerical Combustion*, Aachen, Germany.
14. Moureau, V., Benard, P., Lartigue, G. & Mercier, R. (2019) Dynamic adaptation of tetrahedral-based meshes for the simulation of turbulent premixed flames. *17th International Conference on Numerical Combustion*, Aachen, Germany.
15. Domingo-Alvarez, P., Lartigue, G., Grish, F., Moureau, V., & Benard, P. (2019) Development of a two-level OH-PLIF model for LES for comparison with raw OH-Fluorescence images. *17th International Conference on Numerical Combustion*, Aachen, Germany.
16. Benard, P., Lartigue, G., Moureau, V. & Mercier, R. (2018) Large-Eddy Simulation of the lean-premixed PRECCINSTA burner with wall heat loss. *37th International Symposium on Combustion*, Dublin, Irlande.
17. Benard, P., Lartigue, G., Moureau, V. & Mercier, R. (2018) Large-Eddy Simulation of the lean-premixed PRECCINSTA burner with wall heat loss. *25th Journée d'Etude - Belgian Section of the Combustion Institute*, Mons, Belgique.
18. Barnaud, F., Benard, P., Lartigue, G. & Moureau, V. (2018) Wall-Modeled Large Eddy Simulation of flow around Oscillating Wind Turbines dedicated Airfoils. *AIAA SciTech Forum*, Kissimmee, USA.
19. Bricteux, L., Benard, P., Zeoli, S., Lartigue, G., Moureau, V. & Viré, A. (2017) Wall modeled LES of wind turbine wakes with geometrical effects. *DFD Meeting of The American Physical Society*, Denver, USA.
20. Benard, P., Bricteux, L., Moureau, V., Lartigue, G., Beaudet, L., Deglaire, P. & Viré, A. (2017) Highly resolved Large-Eddy Simulation of wind turbine wakes. *Wind Energy Science Conference*, Copenhagen, Denmark.
21. Pushkarev, A., Benard, P., Lartigue, G., Moureau, V., Balarac, G. (2017) Numerical approach for simulation of moving bodies by using the dynamic mesh adaptation method within ALE technique. *ECCOMAS MSF 2017*, Ljubljana, Slovenia.
22. Barnaud, F., Benard, P., Lartigue, G., Moureau, V., Deglaire, P. (2017) Flow around thick airfoils at very high Reynolds number. Stall and dynamic stall applications. *ERCOFTAC DLES11*, Pisa, Italy.
23. Boulet, L., Benard, P., Lartigue, G., Moureau, V. & Didorally, S. (2017) Modeling of conjugate heat transfer in a kerosene/air spray flame used for aeronautical fire resistance tests. *ERCOFTAC DLES11*, Pisa, Italy.
24. Benard, P., Bricteux, L., Moureau, V., Lartigue, G., Beaudet, L., Deglaire, P. & Viré, A. (2017) Highly resolved larde-eddy simulation of wind turbine wakes. *Parrallel CFD Conference*, Glasgow, Scotland.
25. Lartigue, G., Moureau, V. & Benard, P. (2016) Toward large-eddy simulation of complex burners with exascale super-computers: A few challenges and solutions. *SIAM Conference on Parallel Processing for Scientific Computing (PP16)*,. Paris, France.
26. Moureau, V., Lartigue, G. & Benard, P. (2016) Hpc for large-scale unsteady simulations of turbulent reacting multi-phase flows: challenges and perspectives. *Plateform for Advanced Scientific Computing (ACM PASC16) conference*,. Lausanne, Switzerland.
27. Balarac, G., Bénard, P., Lartigue, G., Moureau, V. & Dobrzynski, C. (2015) Mesh adaptation for large-eddy simulations in complex geometries. *Direct and Large-Eddy Simulation 10*,. Limassol, Cyprus.
28. Benard, P., Moureau, V., Lartigue, G. & D'Angelo, Y. (2014) Les modelling of mesocombustion chambers with arrhenius complex chemistry. *19th Australasian Fluid Mechanics Conference*,. Melbourne, Australia.
29. Benard, P., Moureau, V., Lartigue, G. & D?Angelo, Y. (2014) Large-eddy simulation of a H2 enriched CH4/air meso-scale combustor. *35th International Symposium on Combustion*. San Francisco, USA.
30. Benard, P., Moureau, V., Lartigue, G. & D?Angelo, Y. (2014) Large-eddy simulation of a mesocombustion chamber with finite rate chemistry. *ERCOFTAC ETMM 10*. Marbella, Spain.
31. Benard, P., Moureau, V., D'Angelo, Y., Lartigue, G. & Cuif-sjostrand, M. (2013) Les / dns modelling of mesocombustion chambers with arrhenius complex chemistry. *SIAM 14th International Conference on Numerical Combustion*. San Antonio, USA.
32. Benard, P., Moureau, V., Lartigue, G. & D'Angelo, Y. (2013) Large eddy simulation of a meso-scale combustion chamber. *European Combustion Meeting*. Lund, Sweden.

Invited conferences

1. Benard, P., Lartigue, G., Moureau, V., and Mercier, R. (2018) Non-adiabatic Large-Eddy Simulation of the PRECCINSTA burner with skeletal chemistry. Journée thématique en Combustion Turbulente, CERFACS, Toulouse, France.
2. Benard, P., Moureau, V., Lartigue, G., Bricteux, L., Beaudet, L. Deglaire, P. and Viré, A. (2018) Large-Eddy Simulation of wind turbines wakes including geometrical effects. Séminaire invité, laboratoire LUSAC, Cherbourg, France.
3. Benard, P., Moureau, V., Lartigue, G., Bricteux, L., Beaudet, L. Deglaire, P., Viré, A. and Mercier, R. (2018) Exploiting modern HPC computers for the simulation of reacting and non-reacting flows. Séminaire invité, Université Catholique de Louvain, Belgique.
4. Benard, P., Moureau, V., Lartigue, G., Bricteux, L., Beaudet, L. Deglaire, P. and Viré, A. (2017) Méthodes d'actuator line sur un maillage non-structuré pour l'éolien. 2ème journée M2NUM, Rouen, France.
5. Benard, P., Moureau, V., Lartigue, G., and Vaudor, G. (2017) Towards dynamic mesh adaptation for high-fidelity simulations of turbulent combustion. MMG Day, Paris.

6. Benard, P., Moureau, V., Lartigue, G., Bricteux, L., Beaudet, L. and Deglaire, P. (2017) Simulation aux grandes échelles du sillage des éoliennes. 1ère journée M2NUM, Rouen, France.
7. Moureau, V., Lartigue, G. & Benard, P. (2016) Large-eddy simulation of turbulent reacting flows using massively parallel computers: a load-balancing challenge. *Séminaire à la Maison de la Simulation*,. Saclay, France.
8. Guedot, L., Benard, P., Farcy, B., Lartigue, G. & Moureau, V. (2015) High-performance computing for large-eddy simulation of aeronautical burners. *Invited lecture at the High-Pressure High-Reynolds workshop*,. KAUST, Saudi Arabia.
9. Benard, P., Moureau, V., and D'Angelo Y. (2014) A finite-rate chemistry approach for Large Eddy Simulation of pollutant emissions in a meso-scale combustion device. Journée thématique en Combustion Turbulente, CRCT, Paris, France.
10. Benard, P., Moureau, V., and D'Angelo Y. (2014) Large-Eddy Simulation of a centimetric burner. Journée Des Doctorants du CORIA, Rouen, France.
11. Benard, P., Moureau, V., and D'Angelo Y. (2013) Combustion modeling in a centimetric combustor. Journée thématique en Combustion Turbulente, Paris, France.
12. Benard, P., Moureau, V., Lartigue, G. and D'Angelo Y. (2013) Modélisation détaillée d'un brûleur centimétrique. Journée des doctorants Turbomeca, Pau, France.

PhD

Title : Simulation and shape optimization of a centimetric combustor

Supervisors : Yves D'Angelo and Vincent Moureau at CORIA

Industrial collaborations
- Technical consulting for GDTech France : Support for the usage of the LES solver YALES2. 3D reactive simulations of aeronautical combustors