Curriculum Vitae

Meissam Bahlali

Ph.D.

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ResearchGate: *Meissam_Bahlali*
Age: 27
Nationality: French

Education

2015 – 2018 **Ph.D.**, *Ecole des Ponts ParisTech*, Paris, France.
CEREA Lab, Teaching and Research Center in Atmospheric Environment, joint laboratory EDF R&D/Ecole des Ponts ParisTech.

Development of a hybrid Eulerian/Lagrangian stochastic approach to model turbulent dispersion, using a finite volume approach for the Eulerian part and a probability density function method for the Lagrangian stochastic part. Application to atmospheric dispersion and flows.

Link to the thesis: `https://tel.archives-ouvertes.fr/tel-02067289/`

Short summary of the work:

- Stochastic differential equations, probabilistic interpretation of partial differential equations.
- Problems related to stochastic models and their numerical implementation.
- Development of a new approach in the atmospheric dispersion community, based on the PDF (*Probability Density Function*) methods and an Euler/Lagrange formulation.
- Consistency issues between duplicated fields: turbulence modelling, boundary conditions and divergence-free condition.
- Application of this new methodology to realistic atmospheric flows and validation on experimental campaigns.

Jury : Mireille Bossy (Reviewer), Philippe Drobinski (President of Jury, Reviewer), Jacques Moussafir, Bertrand Carissimo, Eric Dupont, Jean-Marc Lacome.

2012 – 2015 **Master of Science**, *Grenoble Institute of Technology – ENSE*^{3}, Grenoble, France.

Major: Fluid Mechanics & Energy Science – Research program.

- Fluid mechanics (theoretical & numerical/CFD aspects), turbulence physics, thermal exchanges, numerical methods, energy engineering.
- *Erasmus* international exchange at Universidad Politécnica de Madrid in 2014.
- Research Internship at Universidad Politécnica de Madrid in 2014.

2010 – 2012 **Classes préparatoires aux Grandes Ecoles**, *Lycée Dumont d'Urville*, Toulon, France.
University-level intensive program to prepare for national competitive examinations for French engineering schools 'Grandes Ecoles'.

Research activity

2021 – ***Research Associate***, *Imperial College London*, Londres, Royaume-Uni.
Unstructured adaptive mesh modelling for density-dependent flow and scalar transport in complex porous media, using a double control volume finite element method.
Applications: understand controls on the delivery of copper-rich fluids to sediment-hosted copper deposits.
CuBES (Copper Basin Exploration Science) project: large, cross-disciplinary and multi-institution consortium research project.

2020 – **Expert**, *HCERES*, France.
The *High Council for Evaluation of Research and Higher Education* (HCERES) is a French independent administrative public authority.

As a member of the expert committee, I contribute to evaluating higher education institutions and groups, research bodies, programmes and degrees offered by higher education institutions.

2020 **Postdoctoral Researcher**, *Aix-Marseille University*, Marseille, France.
M2P2 Lab.

Lattice Boltzmann methods for the moving boundary problem.

Short summary of the work:

- Theoretical and numerical work on the definition of boundary conditions at the interface between fixed and moving meshes.
- Development of new models and algorithms for the analysis and simulation of flows surrounding moving and/or deformable structures, via a lattice Boltzmann approach.
- Applications to aerodynamics and aeroacoustics.

2019 **Research Associate**, *Imperial College London*, Londres, Royaume-Uni.
Unstructured adaptive mesh modelling for density-dependent flow and scalar transport in complex porous media, using a double control volume finite element method. Application to saline intrusion into coastal aquifers.

Short summary of the work:

- Use of the novel 'DCVFEM' (*Double Control Volume Finite Element Method*) formulation, where velocity is discretised finite element (FE)–wise and pressure is discretised control volume (CV)–wise, along with a dynamic mesh optimisation (DMO) algorithm.
- Discretisation: $P_nDGP_{n+1}(CV)$ representation, which has a discontinuous nth-order polynomial representation for velocity and a continuous (order $n+1$) representation for pressure.
- Development of a scalar transport equation within this framework, and application to the modelling of saline water intrusion into coastal freshwater aquifers.

Honors & Awards

2016 **Student of the Year 2016 Award**, *Universum Awards.*
Masters of Engineering and Science category.

Publications in international peer-reviewed journals

Published

Bahlali, M. L., Yoo, H., Favier, J., & Sagaut, P. (2021), A lattice Boltzmann direct coupling overset approach for the moving boundary problem, *Physics of Fluids*, 33(5), 053607.
https://doi.org/10.1063/5.0044994

Yoo, H., Bahlali, M. L., Favier, J., & Sagaut, P. (2021), Hybrid recursive regularized lattice Boltzmann model with overset grids for rotating geometries, *Physics of Fluids*, 33(5), 057113.
https://doi.org/10.1063/5.0045524

Bahlali, M. L., Henry, C., & Carissimo, B. (2020), On the well-mixed condition and consistency issues in hybrid Eulerian/Lagrangian stochastic models of dispersion, *Boundary-Layer Meteorology*, 174(2), 275-296.
https://doi.org/10.1007/s10546-019-00486-9

Lett, C., Barrier, N., & Bahlali, M. L. (2020), Converging approaches for modeling the dispersal of propagules in air and sea, *Ecological Modelling*, 415, 108858.
https://doi.org/10.1016/j.ecolmodel.2019.108858

Bahlali, M. L., Dupont, E., & Carissimo, B. (2019), Atmospheric dispersion using a Lagrangian stochastic approach: application to an idealized urban area under neutral and stable meteorological conditions, *Journal of Wind Engineering and Industrial Aerodynamics*, 193, 103976.
https://doi.org/10.1016/j.jweia.2019.103976

Bahlali, M. L., Dupont, E., & Carissimo, B. (2018), A hybrid CFD RANS/Lagrangian approach to model atmospheric dispersion of pollutants in complex urban geometries, *International Journal of Environment and Pollution*, 64(1-3), 74-89.
https://doi.org/10.1504/IJEP.2018.099150

Under review

Bahlali, M. L., Salinas, P., & Jackson, M. D. (2021), Unstable density-driven flow modelling using dynamic mesh optimisation and a double control volume finite element method, *Advances in Water Resources*.

Hamzehloo, A., Bahlali, M. L., Salinas, P., Jacquemyn, C., Pain, C. C., Butler, A. P., & Jackson, M. D. (2021), Modelling Saline Intrusion using Dynamic Mesh Optimization with Parallel Processing, *Water Resource Research*.

Publications in international conference proceedings

Bahlali, M. L., Dupont, E., & Carissimo, B. (2018), *Atmospheric pollutant dispersion modeling in realistic non-homogeneous flows using both a CFD Eulerian RANS and a Lagrangian PDF methods*, CWE18 conference, Seoul, South Korea, June 2018.

Bahlali, M. L., Dupont, E., & Carissimo, B. (2017), *Adaptation of the Lagrangian module of a CFD code for atmospheric dispersion of pollutants in complex urban geometries and comparison with existing Eulerian results*, HARMO18 conference, Bologna, Italy, October 2017.

Communications

Talks at international conferences.

- **ASAAQ14** : *Atmospheric Sciences and Application to Air Quality*, Strasbourg, France, May 2017.
- **HARMO18** : *18th International conference on Harmonisation within Atmospheric Dispersion Modelling for Regulatory Purposes*, Bologna, Italy, October 2017.
- **CWE2018** : *7th International Symposium on Computational Wind Engineering*, Seoul, South Korea, June 2018.

Poster, *Club Utilisateurs Code_Saturne 2017*.

Teaching & Training

2020 **Université de Toulon – Teaching Fellow**.

- Probability theory and Statistics (18 hours), tutorials.
  Bachelor Degree in Mathematics, 1^{st} year.
- Programming for Mathematics (24 hours), tutorials (Python).
  Bachelor Degree in Mathematics, 1^{st} year.

2019 **Imperial College London – Training session**.
8-hour course on computational fluid dynamics using high-order control-volume-finite-element and dynamic mesh optimisation, and applications to porous media flows and scalar transport.

Administrative responsibilities

2016 **PhD student Representative**.

- In charge of the organisation of PhD Day 2016.
- In charge of bridging the gap between PhD students and administration.
- In charge of animating the PhD community with events and information.

Skills

Programming C++, C, Python, Fortran, Shell, Linux, LaTeX, Matlab, Maple, Mathematica.

Logiciels
- **CFD tools** : ANSYS Workbench-FLUENT, STAR-CCM+, *Code_Saturne*, IC-FERST, ProLB.
- **Autres** : Microsoft Office, CATIA, Abaqus.

Languages French (native), English (C2*, TOEIC 985/990), Spanish (C2*), Arabic (B1*), Portuguese (A2*).

[* *indicative level*]