

CURRICULUM VITÆ

Michele Botti

1 PERSONAL INFORMATION

Family name	Botti
First name	Michele
Birth date	15 March 1991
Nationality	French, Italian
Profession	Postdoctoral researcher
Title	PhD
Web (me@)	Personal Webpage PoliMi ORCID Google Scholar ResearchGate Scopus Web of Science
Email	michele.botti@polimi.it
Phone (work)	+39 02 2399 4521
Address (work)	Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milano, Italy.

2 WORK EXPERIENCE

Dates	July 2022 - pres.
Institution	Politecnico di Milano - MOX, Milano, Italy.
Position	RTDa - Assistant professor
Job description	Researcher with fixed-term contract according to art. 24, paragraph 3, letter a) of Law 31.12.2010, n. 240. Scientific sector: MAT/08 - Numerical Analysis.
Dates	July 2020 - June 2022.
Institution	Politecnico di Milano - MOX, Milano, Italy.
Position	Marie Skłodowska–Curie research fellow
Job description	ER of the PDGeoFF project, funded by the EU in the context of MSCA International Fellowships focusing on the development of a mathematical and numerical framework to evaluate risks related to human geological activities.
Dates	March 2019 - June 2020.
Institution	Politecnico di Milano - MOX, Milano, Italy.
Position	Postdoctoral researcher
Job description	Postdoctoral fellowship within the team-project MUFLOT in collaboration with ENI. Mathematical modelling of fluid flow and reactive transport in porous media.
Dates	October 2018 - February 2019.
Institution	Università degli Studi di Bergamo - Department of Engineering, Bergamo, Italy.
Position	Teaching assistant.
Job description	Mathematical analysis courses of the Bachelor's degree in engineering.

Dates January 2018 - September 2018.
Institution Bureau des Recherches Géologiques et Minières (BRGM), Orléans, France.
Position Intern during PhD.
Job description Development and analysis of efficient Hybrid High-Order and discontinuous Galerkin discretization methods for hydro-poro-mechanical simulation.

3 EDUCATION

Dates October 2015 - November 2018.
Institution Université de Montpellier - IMAG, France.
Title PhD in Applied Mathematics and Modelling.
Date of award 27 November 2018.
Thesis Advanced polyhedral discretization methods for poromechanical modelling.
Supervisor Prof. Daniele A. Di Pietro.
Fundings Université de Montpellier, BRGM, Labex NUMEV.

Dates October 2013 - September 2015.
Institution Università degli Studi di Pavia, Italy.
Title Master degree in Mathematics.
Graduation mark 110/110 cum laude.
Dissertation A nonconforming high-order method for the Biot problem on general meshes.
Advisor Prof. Daniele Boffi.

Dates October 2010 - September 2013.
Institution Università degli Studi di Pavia, Italy.
Title Bachelor degree in Mathematics.
Graduation mark 110/110 cum laude.
Dissertation Il metodo del residuo minimo generalizzato per la risoluzione di sistemi lineari.
Advisor Prof. Daniele Boffi.

Dates September 2005 - July 2010.
Institution Scientific High School F. Lussana, Bergamo, Italy.
Title Scientific certificate (diploma).
Final mark 100/100.

4 MOBILITY

Dates February 2015 - August 2015.
Institution Université de Montpellier - IMAG, France.
Description Erasmus+ Traineeship Programme.
Project Nonconforming high-order discretization methods for continuum mechanics problems on general meshes. Numerical experiments coded in C++ language.

5 GENERAL SKILLS AND PUBLICATION METRICS

Languages Italian (native speaker), French (C2), English (C2), Spanish (A2)
Programming C/C++, Python, L^AT_EX
Scientific softwares Matlab/Octave, Paraview, Open Office, iWork
Scientific libraries FEniCS, FreeFEM++, SpaFEDTe
Scholar 201 citations (134 excluding self citations), h-index 7
Scopus 108 citations (81 excluding self citations), h-index 5
ResearchGate 262 citations (174 excluding self citations), h-index 8

6 GRANTS AND DISTINCTIONS

01/06/2022	Young Researcher Grant INdAM-GNCS 2022-2023 (project: Numerical methods for PDEs)
20/04/2020	MSCA-IF Fellowship for the research project PDGeoFF (supervisor: Prof. P.F. Antonietti)
06/02/2020	Qualification aux fonctions de Maître de conférences (FRANCE), Sections 26

7 RESEARCH

My main research topics include:

- Advanced numerical methods for PDEs
- A priori and a posteriori error analysis
- Computational fluid and solid mechanics
- Geomechanical modelling

7.1 PAPERS IN INTERNATIONAL PEER-REVIEWED JOURNALS

- [1] P. F. Antonietti, M. Botti, and I. Mazziari. “On mathematical and numerical modelling of multiphysics wave propagation with polytopal Discontinuous Galerkin methods: a review”. In: *Vietnam J. Math.* (July 2022). DOI: [10.1007/s10013-022-00566-3](https://doi.org/10.1007/s10013-022-00566-3).
- [2] P. F. Antonietti, M. Botti, I. Mazziari, and S. Nati Poltri. “A high-order discontinuous Galerkin method for the poro-elasto-acoustic problem on polygonal and polyhedral grids”. In: *SIAM J. Sci. Comput.* 44.1 (Sept. 2021), B1–B28. DOI: [10.1137/21M1410919](https://doi.org/10.1137/21M1410919).
- [3] L. Botti, M. Botti, and D. A. Di Pietro. “An abstract analysis framework for monolithic discretisations of poroelasticity with application to Hybrid High-Order methods”. In: *Comput. Math. Appl.* 91.1 (June 2021), pp. 150–175. DOI: [10.1016/j.camwa.2020.06.004](https://doi.org/10.1016/j.camwa.2020.06.004).
- [4] M. Botti, D. Castanon Quiroz, D. A. Di Pietro, and A. Harnist. “A Hybrid High-Order method for creeping flows of non-Newtonian fluids”. In: *ESAIM: Math. Model Numer. Anal.* 55.5 (2021), pp. 2045–2073. DOI: [10.1051/m2an/2021051](https://doi.org/10.1051/m2an/2021051).
- [5] M. Botti, D. A. Di Pietro, O. Le Maître, and P. Sochala. “Numerical approximation of poroelasticity with random coefficients using Polynomial Chaos and Hybrid High-Order methods”. In: *Comput. Methods Appl. Mech. Eng.* 361 (Apr. 2020). DOI: [10.1016/j.cma.2019.112736](https://doi.org/10.1016/j.cma.2019.112736).
- [6] M. Botti, D. A. Di Pietro, and P. Sochala. “A Hybrid High-Order discretization method for nonlinear poroelasticity”. In: *Comput. Methods Appl. Math.* 20.2 (Apr. 2020), pp. 227–249. DOI: [10.1515/cmam-2018-0142](https://doi.org/10.1515/cmam-2018-0142).
- [7] M. Botti and R. Riedlbeck. “Equilibrated stress tensor reconstruction and a posteriori error estimation for nonlinear elasticity”. In: *Comput. Methods Appl. Math.* 20.1 (Jan. 2020), pp. 39–59. DOI: [10.1515/cmam-2018-0012](https://doi.org/10.1515/cmam-2018-0012).
- [8] M. Botti, D. A. Di Pietro, and A. Guglielmana. “A low-order nonconforming method for linear elasticity on general meshes”. In: *Comput. Methods Appl. Mech. Eng.* 354 (Sept. 2019), pp. 96–118. DOI: [10.1016/j.cma.2019.05.031](https://doi.org/10.1016/j.cma.2019.05.031).
- [9] M. Botti, D. A. Di Pietro, and P. Sochala. “A Hybrid High-Order method for nonlinear elasticity”. In: *SIAM J. Numer. Anal.* 55.6 (Nov. 2017), pp. 2687–2717. DOI: [10.1137/16M1105943](https://doi.org/10.1137/16M1105943).
- [10] D. Boffi, M. Botti, and D. A. Di Pietro. “A nonconforming high-order method for the Biot problem on general meshes”. In: *SIAM J. Sci. Comput.* 38.3 (May 2016), A1508–A1537. DOI: [10.1137/15M1025505](https://doi.org/10.1137/15M1025505).

7.2 BOOK CHAPTERS

- [11] L. Botti, M. Botti, and D. A. Di Pietro. “Polyhedral Methods in Geosciences”. In: SEMA-SIMAI. Springer, July 2021. Chap. A Hybrid High-Order method for multiple-network poroelasticity, pp. 227–258. DOI: [10.1007/978-3-030-69363-3_6](https://doi.org/10.1007/978-3-030-69363-3_6).

7.3 PREPRINTS

- [12] P. F. Antonietti, S. Bonetti, and M. Botti. *Discontinuous Galerkin approximation of the fully-coupled thermo-poroelastic problem*. Submitted. May 2022. arXiv: [2205.04262](https://arxiv.org/abs/2205.04262) [math.NA].
- [13] M. Botti, D. A. Di Pietro, and M. Salah. *A serendipity fully discrete div-div complex on polygonal meshes*. July 2022. URL: <https://hal.archives-ouvertes.fr/hal-03723495>.
- [14] M. Botti, A. Fumagalli, and A. Scotti. *Uncertainty quantification for mineral precipitation and dissolution in fractured porous media*. Submitted. July 2022. arXiv: [2207.06299](https://arxiv.org/abs/2207.06299) [math.NA].

7.4 CONFERENCE PAPERS

- [15] M. Botti, D. A. Di Pietro, and P. Sochala. “A nonconforming high-order method for nonlinear poroelasticity”. In: *Finite Volumes for Complex Applications VIII – Hyperbolic, Elliptic and Parabolic Problems*. 2017, pp. 537–545. DOI: [10.1007/978-3-319-57394-6_56](https://doi.org/10.1007/978-3-319-57394-6_56).

7.5 THESES

- [16] M. Botti. “Advanced polyhedral discretization methods for poromechanical modelling”. PhD thesis. University of Montpellier, Nov. 2018. URL: <https://tel.archives-ouvertes.fr/tel-01871074>.

7.6 INVITED TALKS AT CONGRESSES AND SCIENTIFIC EVENTS

Dates Forthcoming, September 29-30, 2022
Congress [GIMC-SIMAI-YOUNG 2022](#), GIMC-SIMAI joint workshop for young scientists.
Venue Università degli Studi di Pavia, Italy.
Title Multiphysics wave propagation in porous media with polytopal Discontinuous Galerkin methods.
Minisymposium Poromechanics and Fluid Flows.

Dates June 5-9, 2022
Congress [ECCOMAS 2022](#), European Congress on Computational Methods in Sciences and Engineering.
Venue Oslo, Norway.
Title Polytopal nonconforming methods for multiple-network poroelasticity and thermo-poroelasticity.
Minisymposium Robust and Reliable Methods in Poromechanics.

Dates March 14-18, 2022
Congress [SIAM-PD 2022](#), SIAM Conference on Analysis of Partial Differential Equations.
Venue Virtual event, Berlin, Germany.
Title Functional inequalities in broken Sobolev spaces and applications to polyhedral methods.
Minisymposium Recent Advances in Polygonal Methods and Their Applications.

Dates Postponed to 30 August - 3 September 2021
Congress [SIMAI 2020](#), Congress of the Italian Society of Applied and Industrial Mathematics.
Venue Università di Parma, Italy.
Title A discontinuous Galerkin method for wave propagation problem in poroelastic-acoustic media.
Minisymposium Advances in Polygonal and Polyhedral methods.

Dates July 25-29, 2021
Congress [USNCCM 16](#), 16th U.S. National Congress on Computational Mechanics.
Venue Virtual event, Chicago, USA.
Title Polyhedral nonconforming discretization methods for multiple-network poroelasticity.
Minisymposium Polygonal and Polyhedral Discretizations in Computational Mechanics.

Dates Postponed to July 12-16, 2021

- Congress** [ICOSAHOM 2020](#), International Conference on Spectral and High Order Methods.
Venue TU Wien Freihaus, Vienna, Austria.
Title Hybrid High-Order methods for creeping flows of non-Newtonian fluids.
Minisymposium High-order face-based discretization methods.
- Dates** May 17-19, 2021
Congress [INdAM workshop 2021](#), Polygonal methods for PDEs: theory and applications.
Venue Online event.
Title Nonconforming monolithic discretizations of multiple-network poroelasticity.
- Dates** 30 September - 4 October 2019
Congress [ENUMATH 2019](#), European Conference on Numerical Mathematics and Advanced Applications.
Venue Delft University of Technology, Egmond aan Zee, The Netherlands.
Title Polynomial Chaos and Hybrid High-Order methods for poroelasticity with random coefficients.
Minisymposium Robust Discretizations for Coupled Elliptic/Parabolic Equations.
- Dates** July 22-27, 2018
Congress [WCCM 2018](#), World Congress on Computational Mechanics.
Venue Columbia University, New York, USA.
Title A Hybrid High-Order method for nonlinear elasticity on general polyhedral meshes.
Minisymposium Polygonal and Polyhedral Discretizations in Computational Mechanics.
- Dates** July 2-6, 2018
Congress [SIMAI 2018](#), Congress of the Italian Society of Applied and Industrial Mathematics.
Venue Sapienza Università, Roma, Italy.
Title A coupled Hybrid High-Order–discontinuous Galerkin method for nonlinear poroelasticity.
Minisymposium Recent Advances in Nonconforming and Polygonal Methods for PDEs.
- Dates** September, 25-29 2017
Congress [ENUMATH 2017](#), European Conference on Numerical Mathematics and Advanced Applications.
Venue University of Bergen, Voss, Norway.
Title A Hybrid High-Order method for nonlinear elasticity.
Minisymposium Polyhedral Methods and Applications.
- Dates** June 5-10, 2016
Congress [ECCOMAS 2016](#), European Congress on Computational Methods in Applied Sciences.
Venue Creta Maris' Conference Center, Crete Island, Greece.
Title A nonconforming high-order method on general meshes for the Biot problem.
Minisymposium Regularized Enriched Approximations and Quadrature for Discontinuities and Singularities.

7.7 CONTRIBUTED TALKS AT CONFERENCES AND WORKSHOPS

- Dates** July 3-7, 2017
Congress [POEMs 2017](#), Polytopal Element Methods in Mathematics and Engineering.
Venue Università di Milano Bicocca, Milano, Italy.
Title A Hybrid High-Order method for nonlinear elasticity.
- Dates** June 12-16, 2017
Congress [FVCA VIII](#), Finite Volumes for Complex Applications VIII.
Venue Université Lille 1, Lille, France.
Title A nonconforming high-order method for nonlinear poroelasticity.

Dates May 26-27, 2017
Congress [EFEF 2017](#), 15th European Finite Element Fair.
Venue Università degli Studi di Milano, Milano, Italy.
Title A Hybrid High-Order method for nonlinear elasticity.

Dates November 21-23, 2016
Congress [IHP quarter on Numerical Methods for PDEs](#), Workshop Industry and Mathematics.
Venue Institut Henri Poincaré, Paris, France.
Title A Hybrid High-Order method for nonlinear elasticity on general meshes.

7.8 INVITED SEMINARS

Date 4 July 2022
Institution MOX, Dipartimento di Matematica, Politecnico di Milano, Italy.
Title [NuMeth group Seminar](#): Functional Inequalities in Broken Sobolev Spaces and Applications to Polyhedral Discretization Methods.

Date 7 December 2021
Institution Université de Montpellier, IMAG, Montpellier, France.
Title [Séminaire ACSIOM](#): On mathematical and numerical modelling of multiphysics wave propagation with polytopal Discontinuous Galerkin methods.

Date 18 December 2018
Institution Politecnico di Milano, Department of Mathematics, Milano, Italy.
Title [MOX Seminar](#): Polyhedral methods for poromechanical modelling.

Date 8 February 2018
Institution University of Nice, Laboratoire J.A. Dieudonné, Nice, France.
Title [Séminaire de l'équipe EDP Analyse Numérique](#): A nonconforming high-order polyhedral method for nonlinear poroelasticity.

Date 29 March 2017
Institution Université de Montpellier, France.
Title [Journées des doctorants IMAG](#): A Hybrid High-Order method for elasticity problems on general meshes.

Date 21 February 2017
Institution EDF Saclay, Paris, France.
Title Séminaire EDF-IMSIA: Hybrid High-Order methods.

Date 7 February 2017
Institution BRGM, Orléans, France.
Title Séminaire DRP/SPU: Méthodes de discrétisation avancées pour la modélisation hydro-poro-mécanique.

7.9 POSTER PRESENTATIONS

Dates 29 April-3 May 2019
Congress [POEMs 2019](#), Polytopal Element Methods in Mathematics and Engineering.
Venue CIRM, Marseille, France.
Title Numerical approximation of poroelasticity with random coefficients using Polynomial Chaos and Hybrid High-Order methods.

Dates November 13-14, 2017
Congress JS6 NUMEV, 6èmes Journées scientifiques du LabEx NUMEV.
Venue SupAgro, Montpellier, France.
Title A nonconforming high-order method for nonlinear poroelasticity.

Dates October 26-28, 2015
Congress POEMs 2015, Polytopal Element Methods in Mathematics and Engineering.
Venue Georgia Tech, Atlanta, USA.
Title A nonconforming high-order method for the Biot problem.

7.10 ORGANIZATION ACTIVITIES

Dates **Forthcoming**, December 12-14, 2022
Congress POEMs 2022, Polytopal Element Methods in Mathematics and Engineering.
Venue Politecnico di Milano, Italy.
Role Member of the Organizing Committee.

Dates **Forthcoming**, September 29-30, 2022
Congress GIMC-SIMAI-YOUNG 2022, GIMC-SIMAI joint workshop for young scientists.
Venue Università degli Studi di Pavia, Italy.
Role Organizer of the minisymposium: *Polygonal and polyhedral methods: theory and applications*.

Dates June 5-9, 2022
Congress ECCOMAS 2022, 8th European Congress on Computational Methods in Applied Sciences.
Venue Oslo, Norway.
Role Organizer of the minisymposium: *Polygonal and Polyhedral Discretizations for PDEs*.

Dates 30 August - 3 September 2021
Congress SIMAI 2020, Congress of the Italian Society of Applied and Industrial Mathematics.
Venue Università di Parma, Italy.
Role Organizer of the minisymposium: *Advances in Polygonal and Polyhedral methods*.

Dates June 21-24, 2021
Congress SIAM-GS 2021, SIAM Conference on Mathematical and Computational Issues in the Geosciences.
Venue Virtual event, Politecnico di Milano, Italy.
Role Organizer of the minisymposium: *Polyhedral discretization methods for geomechanical simulation*.

7.11 PARTICIPATION IN RESEARCH PROJECTS

Dates 2020-2022
Funding European Union under the programme H2020-MSCA-IF, *Amount: 171.473,28 Euro*
Project PDGeoFF: Polyhedral Discretisation Methods for Geomechanical Simulation of Faults and Fractures in Poroelastic Media (Project ID: 896616), *Supervisor: P.F. Antonietti*
Role Beneficiary

Dates 2019-2020
Funding ENI Spa, *Amount: 55.000 Euro*
Project MUFLOT: Multiphase flow and reactive transport in heterogeneous and fractured porous systems, *Coordinator A. Scotti*
Role Investigator

Dates	2015-2018
Funding	Labex NUMEV, <i>Amount: 50.000 Euro</i>
Project	ANR-10-LABX-20: Méthodes numériques adaptées au couplage fort pour la modélisation hydro-poro-mécanique, <i>Coordinator D.A. Di Pietro</i>
Role	Beneficiary (Co-funding for the PhD Thesis)

7.12 COMMUNICATION AND DISSEMINATION ACTIVITIES

Dates	Forthcoming , 29 September - October 16, 2022
Convention	BergamoScienza XX .
Venue	Festival Bergamoscienza, Bergamo, Italy.
Title	Matematica vs Cambiamento Climatico: dai puzzles alle griglie poligonali per la simulazione numerica (funded by EU in the context of the MSCA project PDGeoFF).

Dates	November 10-26, 2021
Convention	Science Is Wonderful! 2021 .
Venue	Secondary schools in Europe (Online)
Title	Mathematical Models vs. Climate Change (in collaboration with European Commission).

Dates	January 25-29, 2016
Convention	SEME 2016 , Semaine d'Étude Maths-Entreprises.
Venue	INRIA Sophia Antipolis Méditerranée, Nice, France.
Title	Calculation of shadows and occlusions in a 3D geometric scene (in collaboration with OPTIS).

Dates	October 2-18, 2015
Convention	BergamoScienza XIII .
Venue	Club Ricreativo di Pignolo, Bergamo, Italy.
Title	The journey of the red blood cell in 4D (in collaboration with Collettivo Zorba).

8 PROFESSIONAL SOCIETIES

- Member of SIAM, Society for Industrial and Applied Mathematics (since 2022)
- Member of InterPore, International Society for Porous Media (since 2021)
- Member of the GNCS-INdAM, Gruppo Nazionale per il Calcolo Scientifico (since 2020)
- Member of UMI, Italian Mathematical Union (since 2020)
- Member of MCAA, Marie Curie Alumni Association (since 2020)
- Member of SIMAI, Italian Society for Industrial and Applied Mathematics (since 2020)

9 EDITORIAL ACTIVITY

I have acted as a referee for international journals in Mathematical Modelling and Scientific Computing:

- Applied Numerical Mathematics
- Mathematics of Computations
- Numerical Algorithms
- SIAM Journal on Scientific Computing
- Computers & Mathematics with Applications
- ESAIM Mathematical Modelling and Numerical Analysis
- Journal of Scientific Computing
- Computational Methods in Applied Mathematics

- Mathematical Methods in Applied Sciences
- Journal of Computational Physics
- Mathematical Reviews

10 TEACHING ACTIVITY

Academic year	2022-2023
Institution	Politecnico di Milano, Milano, Italy.
Courses	Numerical Linear Algebra (24 hours, lab sessions). First year of the Master's degree in High Performance Computing.
Academic year	2020-2021 and 2021-2022
Institution	Politecnico di Milano, Milano, Italy.
Courses	Numerical Approximation of Mathematical Models and Applications (20 hours, lab sessions). Second year of the Master's degree in Management Engineering.
Academic year	2019-2020
Institution	Politecnico di Milano, Milano, Italy.
Courses	Numerical Modeling of Differential Problems (24 hours, lectures and lab sessions). First year of the Master's degree in Aeronautical Engineering. Curves and Surfaces for Design (22 hours, lab sessions). First year of the Bachelor's degree in Product Design.
Academic year	2018-2019
Institution	Università degli Studi di Bergamo - Department of Engineering, Bergamo, Italy.
Courses	Mathematical analysis I (36 hours, lectures and lab sessions). First year of the Bachelor's degree in Technologies for Health. Mathematical analysis II (24 hours, lectures and lab sessions). Second year of the Bachelor's degree in Computer Engineering.
Academic year	2017-2018
Institution	Université de Montpellier, Montpellier, France.
Courses	Linear Algebra and Analysis (48 hours, lab sessions). First year of the Bachelor's degree in Mathematics. Introduction to Scientific Calculus (24 hours, lab sessions). First year of the Bachelor's degree in Mathematics.
Academic year	2015-2016 and 2016-2017
Institution	Université de Montpellier, Montpellier, France.
Courses	Euclidean Geometry and Bilinear Algebra (36 hours, lectures and lab sessions). Second year of the Bachelor's degree in Engineering. Biomaths (36 hours, lab sessions). First year of the Bachelor's degree in Biological Sciences.
Academic year	2014-2015
Institution	Università degli Studi di Pavia, Pavia, Italy.
Courses	Mathematics tutorials (110 hours). First year of the Bachelor's degree in Biology, Drug Sciences, and Economics.