

# POLIZZI Bastien

*Post-Doctorant*

*Institut Camille Jordan*

*Université Claude Bernard - Lyon 1*

*Bâtiment Braconnier, bureau 224*

*43, boulevard du 11 Novembre 1918*

*69622 VILLEURBANNE CEDEX*

✉ [polizzi@math.univ-lyon1.fr](mailto:polizzi@math.univ-lyon1.fr)

<http://math.unice.fr/~polizzi/>

---

## Research subjects:

- Continuum mechanics and mixture theory: application to biology
- Numerical methods for PDEs systems of advection-reactions-diffusion equations
- Hyperbolic system of conservation law with constraint, application road traffic
- Well-balanced and asymptotic-preserving numerical scheme for PDEs
- Population balance model and quadrature based moment methods

---

## Academic professional experiences:

Currently **Post-Doctorant in mathematics**, *Institut Camille Jordan*, Université de Lyon 1, project: ERC MESOPROBIO.

2018 **Post-Doctorant in mathematics**,  
Jan. to Juin *Fields Institute for Research in Mathematical Sciences & University of Waterloo*,  
Toronto, Canada.  
Thematic Program on Emerging Challenges in Mathematical Biology

2016 to 2017 **Post-Doctorant in mathematics**,  
*Institut of Fluids Mechanics of Toulouse (IMFT)*, France,  
Project BIREM: BIological, REacting, Multiphase flows,  
Co-advised by: Rodeney O. FOX, Pascal FEDE and Jérôme MORCHAIN.  
Mathematical modeling of bioreactors: from cell to reactor scale

2013 to 2016 **PhD student in mathematics**,  
*Laboratory J. A. Dieudonné*, *University Côte d'Azur*, Nice, France,  
Co-advised by: Thierry GOUDON and Magali RIBOT.  
Modeling and numerical simulations for fluid mechanics systems with constraints; application to biology and road traffic

2013 to 2016 **Teaching Assistant**, *University Côte d'Azur*, Nice.  
Teaching duty: 64 hours per year

2013 March **Internship in applied mathematics**,  
to July *Laboratory J. A. Dieudonné*, *University Côte d'Azur*, Nice, France,  
Co-advised by: Magali RIBOT et Florent BERTHELIN.  
Modelling of multi-lane road traffic flow

2010 to 2011 **Referent for international exchange students**, *University Côte d'Azur*.  
Support in administrative processes and cultural visits of the city of Nice and surrounding areas

---

## Invitations:

April 2015 **Consiglio Nazionale delle Ricerche**, *Italie: Rome*.  
Roberto NATALINI

January 2015 **Consiglio Nazionale delle Ricerche**, *Italie: Rome*.  
Roberto NATALINI

---

## Academic training and diplomas:

- September 2016 **PhD in mathematics**,  
*Laboratory J.A. Dieudonné, University Côte d'Azur, Team PDE and numerical analysis & Team COFFEE of Inria Nice Sophia-Antipolis, France.*  
Dissertation title: *Modeling and numerical simulations for fluid mechanics systems with constraints; application to biology and road traffic*, co-advised by: Thierry GOUDON & Magali RIBOT. Composition of the jury:  
– Stephane DESCOMBES, examiner, *Professor at University Côte d'Azur*,  
– Thierry GOUDON, director, *Research director at INRIA*,  
– Celine GRANDMONT, reviewer, *Research director at INRIA*,  
– Florence HUBERT, examiner, *Professor à l'University of Aix Marseille*,  
– Thomas LEPOUTRE, examiner, *Research associate at INRIA*,  
– Clair POIGNARD, reviewer, *Research associate at INRIA*,  
– Magali RIBOT, director, *Professor at the University of Orléans*.
- 2012 - 2013 **Master degree in applied Mathematics**, *University Côte d'Azur, Nice.*  
Specialty: Partial differential equations, control and numerical analysis
- July 2012 **Agrégation of Mathematics**, *French highly competitive examination for being an high school teacher and university lecturer.*
- 2010 to 2012 **Master for Agrégation in Mathematics**, *University Côte d'Azur, Nice.*  
Training for the examination of Agrégation of Mathematics, speciality: symbolic computation.
- 2009 to 2010 **First year of Master degree in Mathematics**, *University of Montréal in Québec (Canada).*
- 2008 to 2009 **Degree in fundamental and applied Mathematics**, *University Côte d'Azur, Nice.*
- 2006 to 2008 **Higher School Preparatory Classes**, *Lycée Masséna, Nice.*  
Fields of study: Mathematic, Physics and Chemistry (PCSI/PC)

---

## Computer skills:

Programming:	Matlab, Scilab, Maple, C/C++	Visualisation:	Paraview, Ensight
HPC:	C/C++, OpenMP		
Office:	L <sup>A</sup> T <sub>E</sub> X, iWork, Microsoft Office	HTML:	Some basic knowledge

---

## Supervision:

- 2018 August **CEMRACS summer school project**, *Centre international de rencontres mathématiques - Marseille Luminy, A Multi-Scale Epidemic Model of Salmonella infection with Heterogeneous Shedding*, Co-advised with M. Ribot, S. Labarthe & B. Laroche.
- 2014 Jun - November **Master 2 internship of Tathagata Goswami**, *University Côte d'Azur, Nice*,  
Mathematical model and numerical simulations of fibres degradation by the intestinal microbiota.  
Co-advised with T. Goudon, and M. Ribot

---

## Teaching experiences:

- 2013 - 2016 **Teaching Assistant**, *University Côte d'Azur, Nice.*  
Higher Institute of Economics and Management:  
◦ L1, Economics and Management: Fundamental analysis and integration (2 × 60 hours)  
◦ L2, Economics and Management: Suites and series (30 hours)  
◦ L1, Sociology and Economics: Fundamental analysis and linear algebra (30 hours)
- 2015 **Teaching Assistant**, *University Côte d'Azur, Nice*, (12 hours).  
Faculty of Sciences: Mathematic-Electronic, Oral examination for fundamental analysis

2009 **Math tutoring**, *Guillaume Apollinaire High school of Nice*, (30 hours).

---

## Foreign languages:

English: Fluent

Italian: Some basic knowledge

---

## Publications:

### Published articles

- 2018 **A two-dimensional population balance model for cell growth including multiple uptake systems**, *Chemical Engineering Research and Design* (DOI).  
V. Quedeveille, H. Ouazaite, B. Polizzi, R. O. Fox, P. Villedieu, P. Fede, F. Létisse, and J. Morchain
- 2017 **A time-space model for the growth of microalgae biofilms for biofuel production**, *Journal of Theoretical Biology: Volume 432*, 7 November 2017, Pages 55-79 (DOI).  
B. Polizzi, O. Bernard, M. Ribot
- 2017 **Asymptotic problems and numerical schemes for traffic flows with unilateral constraints describing the formation of jams**, *Applied Math. Journal Networks and Heterogeneous Media : Volume 12 (4) 2017* (DOI).  
F. Berthelin, T. Goudon, B. Polizzi, M. Ribot
- 2016 **A mixture model for the dynamic of the gut mucus layer**, *Esaim: proceedings and surveys, Volume 55, December 2016* (DOI).  
T. El Bouti, T. Goudon, S. Labarthe, B. Laroche, B. Polizzi, A. Rachah, M. Ribot, R. Tesson

### Submitted articles

**An ecological model of the gut microbiota interacting with its fluidic environment.**

S. Labarthe, B. Laroche, B. Polizzi, M. Ribot

### Articles in preparation

**Simulating photosynthetic biofilm activity and structure.**

B. Polizzi, O. Bernard, F. Lopes, M. Ribot

**Continuous model in time and space for horizontal gene transfers in bacterial biofilms.**

B. Polizzi, B. Ingalls

---

## Séjours thématiques :

- Août 2018 **CEMRACS : Numerical and mathematical modeling for biological and medical applications**, *CIRM à Marseille*, 4 semaines.  
Projet: *A Multi-Scale Epidemic Model of Salmonella infection with Heterogeneous Shedding.*
- Août 2015 **CEMRACS : Coupling Multi-Physics Models involving Fluids**, *CIRM à Marseille*, 5 semaines.  
Projet: *A mixture model for the dynamic of mucosal barrier.*

---

## Talks and conferences:

### Selected Presentations:

- October 2018 **Team days seminary *Mathematical Modelling and Scientific Computing***, *Institut Camille Jordan, INSA Lyon*.  
Mathematical model coupling rheology and microbiota population dynamic for the gut

- Agust 2018 **CEMRACS 2018: Numerical and mathematical modeling for biological and medical applications**, *Centre international de rencontres mathématiques*, Marseille Luminy.  
Effect of the harvest on the productivity of microalgae phototrophic biofilm
- Mai 2018 **Workshop on Mathematics for Complex Microbial Systems**, *Fields Institute*, Toronto, Canada.  
Mixture theory models for microalgae phototropic biofilm
- February 2018 **Mathematical Biology Seminar**, *Fields Institute*, Toronto, Canada.  
Mixture theory models for phototropic biofilm and gut rheology
- January 2018 **Séminaire de l'équipe du professeur Brian INGALLS**, *University of Waterloo*, Canada.  
Mixture theory models for phototropic biofilm and gut rheology
- 2017 **Seminary of applied Mathematic of the University of Nantes**, *Modeling and numerical simulation for fluid mechanics systems with constraints: application to road traffic and biology..*
- 2017 **Seminary of the INRIA Project Lab *Algae in silico***, *Numerical estimation of the harvest on productivity of microalgae biofilm.*
- 2017 **Work group: Mathematics for biology**, **Toulouse Mathematical Institute**, *Mixtures models for microalgae biofilms and rheology of the large intestine.*
- 2017 **Team seminary: Particules, Sprays et combustions**, **Institut de Mécanique des Fluides de Toulouse**, *Simulations for biology and road traffic.*
- 2016 **Applied Analysis Days Nice-Toulon-Marseille**, *Mathematical models of mixtures theory, application to phototrophic micro-algae biofilms and intestinal mucus.*
- 2016 **Theses day of the team PDE-NA of Laboratory J.A. Dieudonné**, *University Côte d'Azur, Nice, Mathematical models of mixtures theory, application to phototrophic micro-algae biofilms and intestinal mucus.*
- 2015 **CEMRACS**, *CIRM Marseille, A mixture model of the mucosal barrier dynamic.*
- 2015 **PhD annual seminary of EDSFA 2015**, *University Côte d'Azur, Nice. Mathematical model for micro-algae biofilms*
- 2014 & 2015 **Invited to for annual team seminary of Biocore.**  
*2015: Model for the growth of micro-algae biofilms and numerical results,*  
*2014: A time-spece model for the growth of micro-algae biofilms.*
- 2014 **Annual team seminary of COFFEE**, *Numerical simulations for the constrained Aw-Rasclé model.*
- 2014 to 2015 **PhD seminar of the PDE and Numerical Analysis team.**  
*2015: Model for the growth of micro-algae biofilms and numerical results,*  
*2015: Mathematical model for micro-algae biofilms*  
*2014: Numerical simulations for the modified constrained Aw-Rasclé model*
- Poster :
- Juin 2018 **Conference on Multiscale Problems in Materials and Biology**, *A conference in honor of Leonid Berlyand's 60th birthday*, The Fields Institute, Toronto.  
A time-space model for the growth of microalgae biofilms for biofuel production
- Selected conferences (as auditor):
- Juin 2018 **Conference on Multiscale Problems in Materials and Biology**, *The Fields Institute for Research in Mathematical Sciences*, Toronto.

- 2018 **CMM-Fields-Inria Workshop on Mathematics for Medicine**,  
*The Fields Institute for Research in Mathematical Sciences*, Toronto.
- 2014 **Mathématiques Appliquées à la MODélisation du VIVant (MAMOVI)**,  
*Lyon*.
- 2014 **Models for bacterial biofilms formation: mathematical, physical and biological perspectives**, *Nice*.
- 2015 **Journées Jeunes EDPistes Français**, *Saint-Brevin-les-Pins*.
- 2013 **Asymptotic behaviour of systems of PDE arising in physics and biology: theoretical and numerical points of view**, European center for mathematics, physics and their interactions (CEMPI, Lille).

---

## Other diplomas and professional experiences:

- 2010 to 2011 **Federal sailing instructor**, *Municipal club of Cagnes-sur-mer*.  
Training of children from 7 to 10 year old on Optimist boat for competitions
- 2006, 2007, **Federal sailing instructor**, *Municipal club of Cagnes-sur-mer*.  
2009, 2011 Beginners and advanced training during the summer school for children from 7 to 16 year old on optimistic boad and Hobbie-cat 14 or 16
- July 2006 **Federal degree sailing instructor**, *Municipal club of Cagnes-sur-mer*.

---

## Hobbies, interests other informations:

- Sail Hobbie-cat 16 crewed and windsurfing
- Mountain Hiking, skiing, surfing and climbing
- Travels Canada (Quebec and East Coast); Road trip in west of the United-States; London; Italy (Rome, Venice, Tuscany)
- Other Social dances: Tango, Blues
- License Driving and boat license