

Paul Cazeaux

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Citizenship: **France.**

————— Contact information

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————— Current position

2018-* **Assistant Professor, Department of Mathematics, University of Kansas.**

————— Previous employment

2017-2018 **Visiting Assistant Professor, Department of Mathematics, University of Kansas.**

2014–2017 **Postdoc, School of Mathematics, University of Minnesota.**

2013–2014 **Postdoctoral collaborator, EPF Lausanne, Chair of Computational Mathematics and Simulation Science (MCSS), SB Mathematics Institute of Computational Science and Engineering (MATHICSE), with Prof. Jan Hesthaven.**

Sept.–Oct. 2013 **UPMC Researcher, Université Pierre et Marie Curie (Paris VI).**

○ Industrial Project with Metrolab, Feb.–Oct. 2013

2012–2013 **ATER (Teaching and Research Assistant), UPMC (Paris VI).**

2009–2012 **Monitorat (Teaching Assistant), UPMC (Paris VI).**

2009–2012 **Visiting student, Brown University, within the Paris VI–Brown University joint PhD program, in collaboration with J. Hesthaven.**

2008 **Master Internship, Laboratoire Jacques Louis Lions.**

————— Research interests

- Numerical analysis
- Scientific Computing – Algorithms, Direct numerical simulation
- Multiscale Methods – Homogenization, Projective time integration
- Partial Differential Equations
- Optimization and Control
- Applications – Materials science, Quantum mechanics, Plasma physics, Biology and Medicine

Education

- Sept. 2009 – **PhD Thesis in Applied Mathematics at Université Pierre et Marie Curie (Paris VI)**, under the supervision of Céline Grandmont (Inria) and Yvon Maday (LJLL), within a joint PhD program between Paris VI and Brown University (Providence, USA).
Dec. 2012
- 2008 **Agrégation de Mathématiques.**
- 2005–2009 **ENS Predoctorate in Mathematics, at Ecole Normale Supérieure (Paris).**
- 2006–2008 **Master 2 Mathematics and Applications with honors, UPMC (Paris VI).**
- 2005–2006 **Bachelor degree in Mathematics, Paris VII/ENS.**
- July 2005 **Enrolled at Ecole Normale Supérieure de Paris (ENS), National rank 30th.**

PhD Thesis

Title *A few mathematical homogenized models applied to modeling the lungs' parenchyma*

Defense December 12, 2012

	<i>Directors</i>	Céline Grandmont	(Inria)
		Yvon Maday	(Université Pierre et Marie Curie)
	<i>Referee</i>	Eric Bonnetier	(Université Joseph Fourier)
Committee	<i>Examiners</i>	Catherine Choquet	(Université de La Rochelle)
		Frédéric Hecht	(Université Pierre et Marie Curie)
	Bertrand Maury	(Université Paris-Sud)	
	Damien Vergnaud	(École Normale Supérieure)	
	<i>Invited member</i>	Jan Hesthaven	(Brown University)

Favorable referee's reports from Prof. Eric Bonnetier (Université Joseph Fourier) and Prof. Yves Capdeboscq (University of Oxford).

Publications

Published and Accepted

- [1] S. N. Shirodkar, M. Mattheakis, P. Cazeaux, P. Narang, M. Soljačić, and E. Kaxiras. Quantum plasmons with optical-range frequencies in doped few-layer graphene. *Physical Review B*, 2018.
- [2] A. Bakhta, E. Cancès, P. Cazeaux, S. Fang, E. Kaxiras. Compression of Wannier functions into Gaussian-type orbitals. *Computer Physics Communications*, 2018.
- [3] P. Cazeaux and M. Luskin. Cauchy-Born strain energy density for coupled incommensurate elastic chains. *To Appear in ESAIM: Mathematical Modelling and Numerical Analysis*.
- [4] E. Cancès, P. Cazeaux and M. Luskin. Generalized Kubo Formulas for the Transport Properties of Incommensurate 2D Atomic Heterostructures. *Journal of Mathematical Physics*, 2017.
- [5] S. Carr, D. Massatt, S. Fang, P. Cazeaux, M. Luskin, and E. Kaxiras. Twistronics: Manipulating the Electronic Properties of Two-dimensional Layered Structures through their Twist Angle. *Physical Review B*, 2017.
- [6] P. Cazeaux, M. Luskin and E. Tadmor. Analysis of rippling in incommensurate one-dimensional coupled chains. *SIAM: Multiscale Modeling & Simulation*, 2017.

- [7] G. Tritsarlis, S. Shirodkar, T. Kaxiras, P. Cazeaux, M. Luskin, P. Plechac and E. Cancès. Perturbation theory for weakly coupled two-dimensional layers. *Journal of Material Research*, 2016.
- [8] P. Cazeaux and J.S. Hesthaven. Projective multiscale time-integration for electrostatic particle-in-cell methods. *Accepted for publication in Computer Physics Communications*.
- [9] P. Cazeaux and O. Zahm. A fast boundary element method for the solution of periodic many-inclusion problems via hierarchical matrix techniques. *ESAIM:Proceedings*, 2015.
- [10] P. Cazeaux, C. Grandmont and Y. Maday. Homogenization of a Model for the Propagation of Sound in the Lungs. *SIAM: Multiscale Modeling & Simulation*, 2015.
- [11] P. Cazeaux and C. Grandmont. Homogenization of a Multiscale Viscoelastic Model with Nonlocal Damping, Application to the Human Lungs. *Math. Models & Methods in Applied Sciences*, 2015.
- [12] P. Cazeaux and J.S. Hesthaven. Multiscale modelling of sound propagation through the lung parenchyma. *ESAIM: Mathematical Modelling and Numerical Analysis*, 2014.

Submitted

- [13] H. Yoo, K. Zhang, R. Engelke, P. Cazeaux, S.H. Sung, R. Hovden, A.W. Tsen, T. Taniguchi, K. Watanabe, G-C. Yi, M. Kim, M. Luskin, E.B. Tadmor and P. Kim. Atomic reconstruction at van der Waals interface in twisted bilayer graphene.
- [14] Stephen Carr, Daniel Massatt, Steven B. Torrisi, Paul Cazeaux, Mitchell Luskin, Efthimios Kaxiras. Relaxation and Domain Formation in Incommensurate 2D Heterostructures.
- [15] P. Cazeaux, D. Massatt, M. Luskin. Energy minimization of 2D incommensurate heterostructures.

Declaration of invention

- [16] P. Cazeaux, G. Marck, Y. Maday, and B. Stamm. Computerized system and process for the design of optimal transport plans of one railway transport line to create and/or to renovate, 2016. Patent application by Metrolab, Paris.

Awards/Grants and Honors

- 7/2018–6/2021 **NSF research award DMS-1819220, Principal Investigator (\$81,446)**,
Project title: Novel Computational Mathematics for Aperiodic Multilayers.
- January 2018 **Travel Award (\$1120)**, College of Liberal Arts & Sciences, University of Kansas.
- June 2015 **Best Poster Prize**, Annual Meeting of the French Applied Math Society.

Invited research stays

- 28-31 May 2018 **Workshop on Analysis, Modeling, and Computation for Nanoscale Systems**,
Fields Institute, Toronto, Canada.
- 25–31 Mar. 2018 **Workshop on Theory and Computation for Transport Properties in 2D Materials**,
IMA, Minneapolis, USA.
- 4–10 Feb. 2018 **Research Visit with MATERIALS team**, *Inria Paris, France.*
- 2–9 Apr. 2017 **Research Visit with Prof. Petr Plechac**, Department of Mathematics, *University of Delaware, USA.*
- 28 Aug.–2 Sept. 2016 **BIRS Workshop on Coupled Mathematical Models for Physical and Biological Nanoscale Systems and Their Applications**, *Banff, Canada.*

- 18–22 Jul. 2016 **Research Visit with Prof. Eric Cancès, CERMICS (Ecole des Ponts), Noisy-Champs, France.**
- Sept. 2015–May 2016 **Research Visit, Department of Physics, Harvard’s Paulson School of Engineering and Applied Sciences, Harvard University, Boston, USA.**
- Collaboration with Prof. Efthimios Kaxiras within Multiscale Mathematical Modeling and Design Realization of Novel 2D Functional Materials MURI project.
- 27 July–10 Sept. 2015 **Research Visit, Chair of Computational Mathematics and Simulation Science (MCSS), SB MATHICSE, EPF Lausanne, Switzerland.**
- 10–14 Aug. 2015 **Summer School ‘Computation at Interfaces’, Roscoff, France.**
- 8–14 July 2015 **Research Visit, with Prof. Eric Cancès, CERMICS (Ecole des Ponts), France.**
- 17–22 Mar. 2014 **Research Visit, with Virginie Ehrlacher, CERMICS (Ecole des Ponts), France.**
- Aug. 2013 **Summer School and Research Project, CEMRACS ’13, CIRM, Marseille.**
- Joint work with Olivier Zahm on the COMPRESS project proposed by EDF.

Invited presentations

- October 2018 **Siam CSS 2018 Conference, Norman, Oklahoma.**
- August 2018 **Solid Math 2018 (Satellite of the ICMP 2018 Conference), Montreal, Canada.**
- June 2018 **SIAM MS 2018 Conference, Portland, Oregon.**
- May 2018 **Workshop on Analysis, Modeling, and Computation for Nanoscale Systems, Fields Institute, Toronto, Canada.**
- Mar. 2018 **Applied Mathematics Seminar, UC Berkeley, California.**
- Feb. 2018 **Séminaire de Mathématiques Appliquées, Chaire d’Équations aux Dérivées Partielles et Applications, Prof. Pierre-Louis Lions, Collège de France, Paris, France.**
- Jan. 2018 **Computational Science Seminar, CSCVR, UMass Dartmouth, Massachusetts.**
- May 2017 **Workshop on Mathematical Modeling of 2D Materials, IMA, Minneapolis.**
- Mar. 2017 **Physics and Astronomy Colloquium, University of Kansas.**
- Mar. 2017 **SIAM CSE 2017 Conference, Atlanta, Georgia.**
- Feb. 2017 **Computational and Theoretical Chemistry Seminar, University of Kansas.**
- Jan. 2017 **Mathematics Seminar, University of Warwick, Coventry, UK.**
- Jan. 2017 **Mathematics Colloquium, University of Delaware.**
- Oct. 2016 **Smith Colloquium, Mathematics, University of Kansas.**
- Sept. 2016 **PDE and Numerical Analysis Seminar, University of Delaware.**
- Sept. 2016 **Workshop on Coupled Mathematical Models for Physical and Biological Nanoscale Systems and Their Applications, BIRS Centre, Banff, Canada.**
- July 2016 **CECAM Workshop on Mathematical and numerical analysis of electronic structure models, Roscoff, France.**
- Oct. 2014 **Seminar, Centre de Recherches en Physique des Plasmas, EPFL.**
- Dec. 2013 **Colloquium, Department of Mathematics, Université de Rouen.**

- Oct. 2013 **Numerical Methods Seminar**, *Cermics (Ecole des Ponts)*.
- Jan. 2012 **Numerical Methods Seminar**, *Département de Mathématiques, Paris–Sud (Orsay)*.
- Nov. 2012 **Homogenization and Multiple Scales Seminar**, *LJLL, UPMC (Paris VI)*.

Contributed talks and poster presentations

- Apr. 2018 **Midwest Numerical Day 2018**, *University of Kansas*.
- Sept. 2017 **SIAM Central States Section Conference**, *Fort Collins, Colorado*.
- Sept. 2017 **Workshop on Multiscale Theory and Computation**, *IMA, Minneapolis*, poster presentation.
- Oct. 2016 **Multiscale Materials Modeling 2016 Conference**, *Dijon, France*.
- Apr. 2016 **Seminar**, *Kaxiras group, Department of Physics, Harvard University*.
- Oct. 2015 **SES Conference**, *College Station, Texas*.
- July 2015 **PIRE Workshop: From Grain Boundaries to Stochastic Homogenization**, *Leipzig*, poster presentation.
- June 2015 **Congrès SMAI 2015**, *Les Karellis, France*, poster presentation.
- Mar. 2015 **SIAM CSE 2015 Conference**, *Salt Lake City, Utah*.
- Jun. 2014 **Mathicse Retreat 2014**, *Leysin, Switzerland*.
- June 2013 **Conference on Multiscale Multiphysics Modelling for the Respiratory System**, *Paris, France*.
- May 2013 **Congrès SMAI 2013**, *Seignosse, France*.
- Sept. 2012 **ECCOMAS Congress**, *Vienna, Austria*.
- May 2012 **Congrès National d'Analyse Numérique 2012**, *France*, poster presentation.
- Apr. 2012 **REO team Seminar**, *INRIA Paris–Rocquencourt*.
- Dec. 2011 **Journées Lions–Magenes**, *LJLL, UPMC (Paris VI)*, poster presentation.

Teaching experience

- Fall 2018 **Lecturer, Applied Differential Equations**, *MATH 220, University of Kansas*.
- Spring 2018 **Lecturer, Applied Partial Differential Equations**, *MATH 647, University of Kansas*.
- Fall 2017 **Lecturer, Applied Differential Equations**, *MATH 220, University of Kansas*.
- Fall 2016 **Lecturer, Linear Algebra and Differential Equations**, *MATH 2373 CSE, University of Minnesota*.
- April 2015 **Series of lectures on Introduction to Homogenization**, in course *Topics in Numerical Analysis, Multiscale Numerical Analysis for Materials*, *MATH 8450, University of Minnesota*.
- Spring 2014 **Teaching Assistant, General Mathematics II for Biologists**, *Université de Lausanne*.
- Spring 2013 **Teaching Assistant, Numerical Methods for ODEs (LM336)**, *Université Pierre et Marie Curie (Paris VI)*.
- Fall 2009–2013 **Teaching Assistant, Algebra 1 & Analysis 1**, *Université Pierre et Marie Curie*.

Supervision of student research projects

Spring 2014 **S. Amraoui**, *4th year exchange student from Polytech Nice, semester project, EPFL.*

Spring 2014 **J. Droxler**, *4th year semester project, Master's level, EPFL.*

Membership in Scientific Organizations

Since 3/2014 **SIAM Activity Groups on Applied Partial Differential Equations.**

Since 3/2014 **SIAM Activity Group on Mathematical Aspects of Materials Science.**

Since 3/2014 **SIAM Activity Group on Computational Science and Engineering.**

Since 1/2014 **SIAM**, *Society for Industrial and Applied Mathematics.*

Since 5/2012 **SMAI**, *French Applied Math Society.*

Reviewer

SIAM Journal of Multiscale Modeling and Simulations

SIAM Journal on Scientific Computing

Journal of Computational Physics

Applied Analysis

Journal de Mathématiques Pures et Appliquées

References

Prof. Eric Cancès

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