

CURRICULUM VITAE

Antoine Mellet

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1. Personal Information

Antoine Mellet
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Education Background

- Undergraduate Institution: **École Normale Supérieure de Lyon** (1996-1999)
- Graduate Institution: **Université Paul Sabatier**, Toulouse, France (1999-2003)
- Postdoctoral Institution: **University of Texas at Austin** (2003-2006)

Degrees

- **Magistère de Mathématiques**, École Normale Supérieure de Lyon (1999).
- **Agrégation de Mathématiques** (1999).
- **Ph.D.** (Mathematics), Université Toulouse III, December 2002.
Thesis Advisor: **Pierre Degond**
Postdoctoral Advisor: **L. A. Caffarelli**

Appointments

- July 2011 - present: **Associate Professor** at the *University of Maryland, College Park*
- July 2007 - June 2011: **Assistant Professor** at the *University of Maryland, College Park*
- July. 2006 - June 2008: **Assistant Professor** at the *University of British Columbia*

- Sept. 2003 - July 2006: **Postdoctoral fellow** at the *University of Texas at Austin*
- Sept. 2000 - Aug. 2003: **Teaching Assistant** at the *Université Toulouse III*

Visiting Appointments

- July 2013: **Visiting Professor** at the University Paris-Creteil
- June 2011: **Visiting Professor** at the University Paris Dauphine
- June 2009: **Visiting Professor** at the University of Toulouse III
- July 2008: **Visiting Professor** at the University Paris Dauphine
- February 2008: **Visiting Professor** at the Institut Henri Poincaré
- June 2007: **Visiting Professor** at the University Paris Dauphine

2. Research, Scholarly and creative activities

(a) Books

(b) Articles in Refereed Journals

- (1) T. Goudon, A. Mellet, *Diffusion approximation in heterogeneous media*, Asymptotic Analysis, **28** (2001), 331-358.
- (2) P. Degond, V. Latocha, S. Mancini, A. Mellet, *Diffusion dynamics of an electron gas between two plates*, Meth. Appl. of Analysis, **9** (2002), 127-150.
- (3) A. Mellet, *Diffusion limit of a nonlinear kinetic model without the detailed balance principle*, Monatshefte für Mathematik, **134** (2002), 305-329.
- (4) A. Mellet, B. Perthame, *L^1 contraction property for a Boltzmann equation with Pauli statistic*, C. R. Acad. Sci. Paris, Ser. I, **335** (2002), 337-340.
- (5) T. Goudon, A. Mellet, *Discrete version of the SHE asymptotic: Multigroup neutron transport equations*, Journal Math. Physics, **43** (2002), 3232-3260.
- (6) N. Ben Abdallah, P. Degond, A. Mellet, F. Poupaud, *Electron transport in semiconductor superlattices*, Quarterly Appl. Math., **61** (2003), no. 1, 161-192.
- (7) T. Goudon, A. Mellet, *On fluid limit for the semiconductors Boltzmann equation*, Journal Diff. Equations, **189** (2003), 17-45.
- (8) A. Mellet, *Macroscopic model for coupled surface and volume collisions in semiconductor superlattices*, Asymptotic Analysis **33** (2003), 337-361.

- (9) T. Goudon, A. Mellet, *Homogenization and diffusion asymptotics of the linear Boltzmann equation*, Control, Optimisation and Calculus of Variations, **9** (2003), 371-398.
- (10) A. Mellet, S. Mischler, *Uniqueness and semigroup for the Vlasov equation with elastic-diffusive reflexion boundary conditions*, Applied Math. Lett., **17** (2004), no. 7, 827–832.
- (11) L.A. Caffarelli, K.-A. Lee, A. Mellet *Singular limit and Homogenization for flame propagation in periodic excitable media*, Arch. Rat. Mech. Ana., **172** (2004), 153-190.
- (12) J.P. Bourgade, A. Mellet, L. Mieussens, *Numerical comparison between two Spherical Harmonics Expansion models and a kinetic equation*, Math. Comput. Modeling, **40** (2004), no. 7-8, 777–795.
- (13) L. A. Caffarelli, K.-A. Lee, A. Mellet, *Homogenization and flame propagation in periodic excitable media: The asymptotic speed of propagation*, Comm. Pure and Applied Math, **59** (2006), 501-525.
- (14) L.A. Caffarelli, A. Mellet, *Capillary drops on an inhomogeneous surface*, Perspectives in Nonlinear P.D.E.: In honor of Haim Brezis. Contemporary Mathematics 175–201, Contemp. Math., **446**, Amer. Math. Soc., Providence, RI, 2007.
- (15) A. Mellet, A. Vasseur, *Homogenization of a nonlinear transport equation*, Asymptotic Analysis, **51**, (2007), 157-166.
- (16) A. Mellet, A. Vasseur, *On the barotropic compressible Navier-Stokes equation*, Comm. in P.D.E., **32**, (2007) 431-452.
- (17) L.A. Caffarelli, A. Mellet, *Capillary drops: Contact angle hysteresis*, Calc. Var. Partial Differential Equations **29** (2007), no. 2, 141-160.
- (18) L.A. Caffarelli, K.-A. Lee, A. Mellet, *Flame propagation in one-dimensional stationary ergodic media*, Math. Models Methods Appl. Sci., **17** (2007), 155-169.
- (19) A. Mellet, A. Vasseur. *Global weak solutions for a Vlasov-Fokker-Planck / Navier-Stokes system of equations*, Math. Models Methods Appl. Sci. **17** (2007), no. 7, 1039-1063.
- (20) A. Mellet, A. Vasseur, *Existence and uniqueness of global strong solutions for one-dimensional compressible Navier-Stokes equations*, SIAM Journal on Mathematical Analysis, **39** (2007/08), no. 4, 1344-1365.
- (21) A. Mellet, A. Vasseur, *Asymptotic analysis for a Vlasov-Fokker-Planck/Compressible Navier-Stokes system of equations*, Comm. Math. Phys. **281** (2008), no. 3, 573-596.
- (22) L.A. Caffarelli, A. Mellet, *Random Homogenization of Fractional Obstacle Problems*, Netw. Heterog. Media **3** (2008), no. 3, 523–554.

- (23) L.A. Caffarelli, A. Mellet, *Random Homogenization of an Obstacle Problem*, Ann. Inst. H. Poincaré Anal. Non Linéaire **26** (2009), no. 2, 375–395.
- (24) A. Mellet, A. Vasseur, *A bound from below for the temperature in compressible Navier-Stokes equations*, Monatsh. Math. **157** (2009), no. 2, 143–161.
- (25) I.C. Kim, A. Mellet, *Homogenization of a Hele-Shaw problem in periodic and random media*, Arch. Ration. Mech. Anal. **194** (2009), no. 2, 507–530.
- (26) A. Mellet, A. Vasseur, *L^p estimates for quantities advected by a compressible flow, submitted*, J. Math. Anal. Appl. **355** (2009), no. 2, 548–563.
- (27) A. Mellet, J. Nolen, J.-M. Roquejoffre and L. Ryzhik, *Stability of Generalized Transition Fronts*, Comm. Partial Differential Equations **34** (2009), no. 4-6, 521–552.
- (28) A. Mellet, J.-M. Roquejoffre, Y. Sire, *Generalized fronts for one-dimensional reaction-diffusion equations*, Discrete Contin. Dyn. Syst. **26** (2010), no. 1, 303–312.
- (29) I.C. Kim, A. Mellet, *Homogenization of one-phase Stefan-type problems in periodic and random media*, Trans. Amer. Math. Soc. **362** (2010), 41614190.
- (30) A. Mellet, J. Vovelle, *Existence and regularity of extremal solutions for a mean-curvature equation*, J. Differential Equations **249** (2010), 3775.
- (31) A. Mellet, *Fractional diffusion limit for collisional kinetic equations: A moments method*, Indiana Univ. Math. J. **59** (2010), 1333-1360.
- (32) A. Mellet, *Some mathematical aspects of capillary surfaces*, Panoramas et synthèses, accepted.
- (33) A. Mellet, C. Mouhot, S. Mischler, *Fractional diffusion limit for collisional kinetic equations*, Arch. Ration. Mech. Anal. **199** (2011), 493-525.
- (34) N. Ben Abdallah, A. Mellet, M. Puel, *Anomalous diffusion limit for kinetic equations with degenerate collision frequency*, Math. Models Methods Appl. Sci. **21** (2011), no. 11, 2249-2262.
- (35) C. Imbert, A. Mellet, *Existence of solutions for a higher order non-local equation appearing in crack dynamics*, Nonlinearity **24** (2011) 3487-3514.
- (36) L. Caffarelli, A. Mellet, Y. Sire. *Traveling waves for a boundary reaction-diffusion equation*, Advances in Mathematics, accepted.
- (37) C. Imbert, A. Mellet, *Electrified thin films: Global existence of non-negative solutions*, Ann. Inst. H. Poincaré Anal. Non Linéaire **29** (2012), no. 3, 413-433.

- (38) A. Mellet, J. Nolen, *Capillary drops on a rough surface*, Interfaces Free Bound. **14** (2012), no. 2, 167-184.
- (39) N. Ben Abdallah, A. Mellet, M. Puel, *Fractional diffusion limit for collisional kinetic equations: a Hilbert expansion approach*, Kinet. Relat. Models **4** (2011), no. 4, 873-900.
- (40) L. Cesbron, A. Mellet, K. Trivisa *Anomalous transport of particles in Plasma physics*, Applied Math. Letters, accepted.
- (41) A. Mellet, J.-M. Roquejoffre, Y. Sire, *Existence and asymptotic of fronts in non local combustion models*, Comm Math Sci., accepted.
- (42) T. Karper, A. Mellet, K. Trivisa, *Existence of weak solutions to kinetic flocking models*, SIAM Journal on Mathematical Analysis, accepted.
- (43) T. Karper, A. Mellet, K. Trivisa, *On strong local alignment in the kinetic Cucker-Smale model*, submitted.
- (44) I. Kim, A. Mellet, *Liquid Drops sliding down an inclined plane*, Trans. Amer. Math. Soc., accepted.
- (45) T. Karper, A. Mellet, K. Trivisa, *Hydrodynamic limit of the kinetic Cucker-Smale flocking model*, submitted.
- (46) A. Mellet, *The thin film equation with non zero contact angle: A singular perturbation approach*, preprint.

(c) **Invited talks**

- Workshop "Mathematical Topics in Kinetic Theory"*, Cambridge, UK. June 2013.
- Department of Mathematics, University of Wisconsin, Madison*. April 2013.
- Department of Mathematics, University of Pennsylvania, Philadelphia*. March 2013.
- International conference on "Nonlocal Operators: Analysis, Probability, Geometry and Applications"*, University of Bielefeld, July 2012 (declined).
- AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Orlando, Florida, July 2012 (declined).
- Department of Mathematics, University of Texas*. March 2012.
- AMS eastern sectional meeting, George Washington University*. March 2012.
- Workshop on "Nonlocal PDEs, Variational Problems and their Applications"*, IPAM (Los Angeles) February 2012.
- Department of Mathematics, École Normale Supérieure, Paris*. January 2012
- SIAM Conference on Analysis of Partial Differential Equations*. San Diego, November 2012 (declined).

Workshop "Vlasov Models in Kinetic Theory". ICERM, Providence, RI. September 2012 (declined).
Equadiff 2011, Loughborough University, UK, August 2011 (declined).
Workshop on Probabilistic Methods in Kinetic Theory, CIRM, Luminy. July 2011
South California PDE conference, San Diego. May 2011
Department of Mathematics, Columbia University, New York. May 2011
Conference "Kinetic models of classical and quantum particle systems, a conference in the memory of Naoufel Ben Abdallah". Toulouse, march 2011 (declined).
Workshop "Free Boundary Problems, Theory and Applications", MSRI. March 2011
University of Texas at Austin. October 2010
University of Minnesota. October 2010
Conference Viscosity methods and nonlinear PDE, Hokkaido University, Sapporo, July 2010. (declined).
Department of Mathematics, US Naval Academy. April 2010
Courant Institute of Mathematical Sciences. NYU, April 2010
Conference "Motions of Interfaces and Nonlinear PDEs", Tours, February 2010 (declined).
SIAM Conference on Analysis of Partial Differential Equations. Miami, December 2009
Department of Mathematics, Duke University. November 2009
Department of Mathematics, George Washington University. November 2009
Americas Conference on Differential Equations. Veracruz, Mexico, October 2009 (declined).
Third International Workshop on Variational Analysis and Applications. Erice (Sicily), May 2009
Workshop in PDE and Potential theory, KTH University. Stockholm, June 2009
Institute for Advanced Study. Princeton, January 2009
Department of Mathematics, University of Chicago. November 2008
Department of Mathematics, Georgetown University. November 2008
Conference "Free boundary problem, theory and application", Stockholm. June 2008
Special semester "Singularities and interfaces", Lectures series on Interfaces and hydrodynamic instabilities: Capillary drops and contact angle problems, Institut Henri Poincaré. February 2008

Prairie Analysis Seminar, Manhattan, Kansas. November 2007
Conference on "evolution of interfaces and applications", Roscoff. May 2007
Department of Mathematics, Univeristy of Maryland. February 2007
Department of Mathematics, UCLA. November 2006
SIAM Conference on Analysis of Partial Differential Equations, Boston. July 2006
Conference on "Nonlinear PDEs: Homogenization and Kinetic Equations", Vienna. June 2006
Workshop on "Reaction-diffusion and Free Boundary Problems", Banff. March 2006
Department of Mathematics, Carnegie Mellon University. February 2006
Department of Mathematics, University of Illinois at Urbana-Champaign. February 2006.
Department of Mathematics, Université Paris VI. January 2006
Department of Mathematics, École Normale Supérieure, Paris. January 2006
Conference on "Random Homogenization", CIRM Marseille, France. July 2005
2005 UAB international conference on differential equations and mathematical physics, Birmingham, Alabama. April 2005
Department of Mathematics, École Polytechnique, France. March 2005
Department of Mathematics, University of Texas. February 2005
Department of Mathematics, École Normale Supérieure Ker Lann, Rennes. April 2004
Department of Mathematics, Université Paris Sud, France. May 2004
Department of Mathematics, University of Chicago. February 2004
Department of Mathematics, Université Paul Sabatier, Toulouse. April 2003
Workshop "GdR EAPQ", Bordeaux. February 2003
Department of Mathematics, Université de Nice, Nice. July 2002
Department of Mathematics, Université de Provence, Marseille. June 2002
Department of Mathematics, Université de Bordeaux, France. May 2002
Department of Mathematics, École Normale Supérieure, Paris. April 2002
Workshop on "gyro-kinetic model", Nancy, France. September 2000
Workshop on "non-conventional" applications of kinetic theory, Gothenburg, Sweden. June 2000

(d) **Contracts and Grants**

- i. **N.S.F. Individual Research Grant** DMS-1201426, "Free Boundary Problems for Capillary Surfaces and Other Nonlinear Evolution PDE" July 2012-July 2015. Principal investigator. USD 228,000

- ii. **N.S.F. Individual Research Grant** DMS-0901340, “Non-Linear Partial Differential Equations, Free Boundary Problems and Fractional Operators” July 2009-August 2012. Principal investigator. USD 185,000
- iii. **NSF conference grant** DMS-0901718, “Thematic Program and Summer School in Partial Differential Equations and Applications” Summer 2009. Principal investigator. USD 50,000
- iv. **N.S.E.R.C. Discovery Grant.** April 2007-April 2012. Principal investigator. CAD 110,000
- v. **N.S.F. Individual Research Grant**, DMS-0456647 , “On the Homogenization of Free Boundary Problems” June 2005-May 2008. Principal investigator. USD 81,000

(e) **Fellowships, Prizes and Awards**

- i. University of Texas R. H. Bing Fellowship, Sept. 2003-Aug. 2006.

(f) **Editorship, Editorial boards and Reviewing Activities for Journals**

Reviewer for the following journals:

Communication in Partial Differential Equation (CPDE), Archive for Rational Mechanics and Analysis (ARMA), Mathematical Models and Methods in Applied Sciences (M3AS), Journal of Mathematical Analysis and Applications, Duke Mathematical Journal, Indiana University Mathematics Journal , Journal de Mathématiques Pures et Appliquées (JMPA), Analysis & PDE, Journal of Statistical Physics, Discrete and Continuous Dynamical Systems, Calculus of Variation & PDE, SIAM Journal on Mathematical Analysis (SIMA), Annales de l’Institut Henri Poincaré, Advances in Mathematics, Multiscale Modeling and Simulation, Journal of Differential Equations, Applied Mathematics Letters, Interfaces and Free Boundaries.

3. Teaching, Mentoring and Advising

(a) **Courses taught**

University of Maryland

- Fall 2012: *Calculus III* (Math 241) - 260 students;
Partial Differential Equations for Scientists and Engineers (Math 462) - 20 students
- Spring 2012: *Differential Forms and applications* (Math437) - 16 students

- Fall 2011: *Partial Differential Equations* (**Graduate course** - Math673/Amsc673) - 15 students;
Linear Algebra for Scientists and Engineers (Math 461) - 200 students
- Spring 2011: *Linear Algebra for Scientists and Engineers* (Math 461) - 270 students
- Fall 2010: *Linear Algebra for Scientists and Engineers* (Math 461) - 200 students
- Spring 2010: *Calculus III* (Math 241) - 200 students
- Fall 2009: *Complex Variables for Scientists and Engineers* (Math 463) - 32 students
- Spring 2009: *Introduction to Linear Algebra* (Math 240) - 220 students
- Fall 2008: *Partial Differential Equations for Scientists and Engineers* (Math 462) - 25 students

University of British Columbia

- Spring 2008: *Topics in Analysis* (**Graduate course**); *Topics in Differential Equations: Nonlinear PDEs* (**Graduate course**).
- Fall 2007: *Partial Differential Equations* - 100 students
- Spring 2007: *Elementary Differential Equations II* - 100 students
- Fall 2006: *Ordinary Differential Equations* - 100 students

University of Texas

- Spring 2006: *Calculus II* - 100 students
- Fall 2005: *Calculus II* - 100 students; *Introduction to Real Analysis* - 15 students
- Spring 2005: *Calculus II* - 100 students
- Fall 2004: *Calculus II* - 100 students; *Introduction to Real Analysis* - 15 students
- Spring 2004: *Calculus I* - 100 students
- Fall 2003: *Linear Algebra* - 15 students; *Ordinary Differential Equations* - 100 students

(b) **Course or Curriculum Development**

Developed and taught a new Graduate course on Nonlinear PDEs at the University of British Columbia.

(c) **Advising: Research Direction**

i. Undergraduate:

- Ludovic Cesbron (June-July 2010). Summer Research Project "Anomalous transport of particles in Plasma physics" (paper accepted for publication in Applied Math. Letters).

- ii. Graduate
 - Matias Delgadino (PhD AMSC. Passed Preliminary Oral exam March 2013)
 - Kanna Nakamura (PhD Math. Graduation expected 2014 - Co-advising with Dionisios Margetis)
- iii. Postdoctoral
 - S. Kirch - UBC 2007-2009.
 - T. Karper - CSCAMM 2011-present (3 joint papers submitted for publication).
- iv. Other
 - Applied Partial Differential Equations Research Interaction Team (PDE RIT): interdisciplinary research-oriented working group seminars attended by graduate students, postdocs and faculty.
 - Organization of a summer school on Partial Differential Equations at the University of British Columbia (Vancouver) - Summer 2009 (the summer school was attended by over 90 graduate students from various north american universities).

4. Service

(a) Professional

- i. **Reviewing activities for agencies**
 - Member of NSF review panels (2010, 2011).
 - Reviewer for the Natural Sciences and Engineering Research Council of Canada (NSERC)
- ii. **Organization of Conferences**
 - Co-organizer of a mini-symposium: "Aspects of Homogenization: Analysis and Applications" during the 2013 SIAM Conference on Mathematical Aspects of Materials Science.
 - Co-organizer of the *Thematic Program and Summer School on Partial Differential Equations* at the University of British Columbia (Vancouver) Summer 2009.
 - Co-organizer of the Workshop "Kinetic Description of Multiscale Phenomena: Young Researchers Workshop" (CSCAMM - March 2-5, 2009)
 - Co-organizer of the Workshop "Non-local operators and applications" at the Banff International Research Station (April 28-May 2nd, 2008).

- Co-organizer of a mini-symposium "Aspects of Homogenization: Analysis and Applications" at the SIAM Conference on Mathematical Aspects of Materials Science (Philadelphia, June 2013).

(b) **University**

- Organizer of the PDE seminar, 2009-2012.
- Co-organizer of the PDE-RIT, 2009-present.
- Member of the Admissions Committee for grad. students, Applied Mathematics & Scientific Computation (AMSC) program, Spring 2011.
- Departmental Salary Committee, 2009.