Curriculum Vitae
Antoine Mellet

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1. Personal Information

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Academic Appointments at UMD

- July 2014 - present: **Full Professor**
- July 2011 - June 2014: **Associate Professor**
- July 2008 - June 2011: **Assistant Professor**

Other Employment

- January-June 2015: **Junior Chair** of the *Fondation Sciences Mathématiques de Paris*
- 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*

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**

2. Publications

(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. Poincar Anal. Non Linaire **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*, 91124, Panor. Synthses, **38**, Soc. Math. France, Paris, 2012.

(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*, Adv. Math. 230 (2012).

(37) C. Imbert, A. Mellet, *Electrified thin films: Global existence of non-negative solutions*, Ann. Inst. H. Poincaré. Anal. Non Linaire **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, Appl. Math. Lett. **25** (2012), no. 12, 2344-2348.

(41) A. Mellet, J.-M. Roquejoffre, Y. Sire, *Existence and asymptotic of fronts in non local combustion models*, Commun. Math. Sci. **12** (2014), no. 1, 1-11.

(42) T. Karper, A. Mellet, K. Trivisa, *Existence of weak solutions to kinetic flocking models*, SIAM J. Math. Anal. **45** (2013), no. 1, 215-243.

(43) I. Kim, A. Mellet, *Liquid Drops sliding down an inclined plane*, Trans. Amer. Math. Soc. **366** (2014), no. 11, 6119-6150.

(44) A. Mellet, *The thin film equation with non zero contact angle: A singular perturbation approach*, Comm. Partial Differential Equations **40** (2015), no. 1, 1-39.

(45) T. Karper, A. Mellet, K. Trivisa, *On strong local alignment in the kinetic Cucker-Smale model*, Hyperbolic conservation laws and related analysis with applications, 227-242, Springer Proc. Math. Stat., **49**, Springer, Heidelberg, 2014.

(46) T. Karper, A. Mellet, K. Trivisa, *Hydrodynamic limit of the kinetic Cucker-Smale flocking model*, Math. Models Methods Appl. Sci. **25** (2015), no. 1, 131-163.

(47) A. Mellet, S. Merino, *Anomalous energy transport in FPU-β chain*, J. Stat. Phys. 160 (2015).

(48) J. Carrillo, M. Delgadino, A. Mellet, *Regularity of local minimizers of the interaction energy via obstacle problems*, Comm. Math. Phys., accepted.

(49) C. Imbert, A. Mellet, *Self-similar solutions for a fractional thin film equation governing hydraulic fractures*, Comm. Math. Phys., **340** (2015), 1187-1229

(50) P. Aceves-Sánchez, A. Mellet, *Asymptotic analysis of a Vlasov-Boltzmann equation with anomalous scaling*, Math. Models Methods Appl. Sci. **27** (2017), no. 5, 845-878.

(51) A. Mellet, *Anomalous diffusion phenomena: A kinetic approach.* Séminaire Laurent Schwartz Équations aux dérivées partielles et applications. Année 2014-2015, Exp. No. XII, 16 pp., Ed. Éc. Polytech., Palaiseau, 2016.

(52) A. Mellet, B. Perthame, F. Quirós, *A Hele-Shaw problem for tumor growth.* J. Funct. Anal. 273 (2017), no. 10, 3061-3093.

(53) M. Maier, D. Margetis, A. Mellet, *Homogenization of time-harmonic Maxwell's equations in non-homogeneous plasmonic structures.* J. Comp. and App. Math. **377** (2020).

(54) L. Cesbron, A. Mellet, M. Puel, *Fractional diffusion limit for a kinetic equation in the upper-half space with diffusive boundary conditions.* Arch. Ration. Mech. Anal. **235** (2020).

(55) A. Cucchi, A. Mellet, N. Meunier, *A Cahn-Hilliard model for cell motility.* SIAM J. Math. Anal. **52** (2020).

(56) M. Delgadino, A. Mellet, *On the relationship between the thin film equation and Tanner's law.* Comm. Pure Appl. Math. **74** (2021)

(57) P.-E. Jabin, A. Mellet, M. Molina, *Optimal Transportation in a Discrete Setting.* J. Funct. Anal. **281** (2021)

(58) A. Mellet, Y. Wu *An isoperimetric problem with a competing nonlocal singular term.* Calc. Var. Partial Differential Equations **60** (2021)

(59) N. Guillen, I. Kim, A. Mellet, *A Hele-Shaw limit without monotonicity.* Arch. Ration. Mech. Anal. **243** (2022)

(60) A. Cucchi, A. Mellet, N. Meunier, *Self-polarization and traveling wave in a model for cell crawling migration.* Discrete & Continuous Dynamical Systems. Accepted (2021).

(61) L. Cesbron, A. Mellet, M. Puel, *Fractional Diffusion limit of a kinetic equation with Diffusive boundary conditions in a bounded interval.* Asymptotic Analysis. Accepted (2022)

(62) A. Mellet, Y. Wu Γ-*convergence of some nonlocal perimeters in bounded subsets of* R^n *with general boundary conditions.* Submitted (2021)

(63) I. Kim, A. Mellet, Y. Wu *A density-constrained model for Chemotaxis.* Submitted (2022)

(64) I. Kim, A. Mellet, Y. Wu *Density-constrained Chemotaxis and Hele-Shaw Flow.* Submitted (2022)

(65) I. Kim, A. Mellet *Incompressible limit of a porous media equation with bistable and monostable reaction term.* Submitted (2022)

3. Sponsored Research - Grants

(a) **N.S.F. Individual Research Grant** DMS-2009236 "Free Boundary Problems for Cell Motility and Other Applications". August 2020-July 2023. Principal investigator. USD 326,000

(b) **N.S.F. Individual Research Grant** DMS- 1501067 "Free boundary problems and other partial differential equations". July 2015-July 2019. Principal investigator. USD 270,000.

(c) **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

(d) **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

(e) **NSF conference grant** DMS-0901718, "Thematic Program and Summer School in Partial Differential Equations and Applications" Summer 2009. Principal investigator. USD 50,000

(f) **N.S.E.R.C. Discovery Grant**. April 2007-April 2012. Principal investigator. CAD 110,000

(g) **N.S.F. Individual Research Grant**, DMS-0456647 , "On the Homogenization of Free Boundary Problems" June 2005-May 2008. Principal investigator. USD 81,000

4. Mentoring and Advising

Doctoral

- Michael Rozowski. 2022-present.
- Martin Molina. Co-advising with P.E. Jabin - Graduated May 2020
- Ludovic Cesbron. Co-advising with C. Mouhot (University of Cambridge) - Graduated June 2017
- Matias Delgadino. Graduated Spring 2016
- Kanna Nakamura. Co-advising with Dionisios Margetis - Graduated August 2014

Postodoctoral

- S. Kirch - UBC 2007-2009.
- T. Karper - CSCAMM 2011-2013.
- Y. Wu - UMD 2019-2022