

Édouard OUDET

Full Professor

born on the 23th November 1974

(45 y.o.)

Married, two children (9,13)

Tel: +33 (0)4 57 42 17 71

E-mail: edouard.oudet@imag.fr

<http://www-ljk.imag.fr/membres/Edouard.Oudet/>

Scientific interests Shape Optimization, Convex Geometry, Calculus of Variations, Computational Mathematics.

Employment

September 2011 – present: Full Professor in Applied Mathematics, LJK UMR 5224, University of Grenoble Alpes (France).

Diploma

December 2009: Habilitation à Diriger les Recherches “Optimisation d’interfaces”, University of Savoie.

October 2002: PhD in Applied Mathematics “Quelques résultats en optimisation de forme et stabilisation” at IRMA, University of Strasbourg under the supervision of A. Henrot and V. Komornik.

September 1999: Master in Applied Mathematics at IRMA, University of Rennes I.

Septemebr 1998: “Agrégé de mathématiques”.

Responsabilities

- Leader with G. Besson of the so called "action team" GEOSPEC of the Labex Per-syval (10 researchers): The purpose of this project is to develop a synergy between fundamental and applied mathematicians in order to study the complexity of the geometry of a mathematical object (e.g. a manifold) through three different aspects : its metric, its dynamics and its spectrum. More specifically, we intend to study extremal manifolds for invariants describing this complexity in each of the above items.
- Team Leader of the group CVGI: “Calcul des variations, géométrie, images” of the LJK (10 permanent researchers).
- Member of four ANR projects (National Research Agency): OPTIFORM “Analyse géométrique des formes optimales”, GEOMETRYA “Geometrical measure theory”, DIGITAL SNOW “Modeling and simulation of grains snow at microscopic scale”, TOMMI “Optimal transportation and multi-physics”.
- Deputy director of the teaching department (Mathematics - Computer Science) from September 2012 to September 2014.
- Member of the french national research committee (CNU) 2008–2011.

Honors: I have the benefit of the national grant "Prime d’excellence et de recherche" since September 2003.

Some research visits of other departments: Oberwolfach January 2016 “Mathematical Imaging and Surface Processing” (invitation of M. Rumpf), Beijing ICIAM 2015 “Eigenvalues of partial differential operators and their applications” (invitation de Chiu-Yen Kao), MSRI Berkeley Novembre 2013 one week “Fluid Mechanics, Hamiltonian Dynamics and Numerical Aspects of Optimal Transportation”, Pisa Italy April 2012 (invitation of G. Buttazzo),

MSRI Berkeley March 2011 two weeks: “Free Boundary Problems”, Köln Germany December 2008 (invitation of B. Kawohl), Parma Italy June 2008 (invitation of M. Belloni), Aveiro Portugal February 2008 (invitation of A. Plakhov), Louisiana State University February 2007 (invitation of B. Bourdin), etc.

Five representative publications (of 30 publications in International Journals)

- (1) J.-D. Benamou, G. Carlier, Q. Mérigot and **É. Oudet**, *Discretization of functionals involving the Monge-Ampere operator*, accepted for publication in *Numerische Mathematik* (2015).
- (2) **É. Oudet**, *Numerical shape optimisation under width constraint*, *Discrete and Computational Geometry*, **49.2**, (2013), 411–428, 2012.
- (3) F. Santambrogio, **É. Oudet**, *A Modica-Mortola approximation for branched transport and applications*, *Archive for Rational Mechanics and Analysis*, **201.1** (2011), 115–142.
- (4) G. Buttazzo, C. Jimenez, **É. Oudet**, *An optimization problem for mass transportation with congested dynamics*, *SIAM Journal on Control and Optimization*, **48** 1961–1976, 2009.
- (5) T. Bayen, T. Lachand-Robert, **É. Oudet**, *Analytic parametrization and volume minimization of three dimensional bodies of constant width*, *Archive for Rational Mechanics and Analysis*, **186**, 225–249, 2007.

Full List of Articles in Peer-Reviewed International Journals¹

- (1) M. Bonafini, G. Orlandi and É. Oudet, *Variational approximation of functionals defined on 1-dimensional connected sets: the planar case*, accepted for publication in *SIAM Journal on Mathematical Analysis (SIMA)*.
- (2) E. Bretin, R. Denis, J-O. Lachaud, É. Oudet, *Phase-field modelling and computing for a large number of phases*, accepted for publication in *ESAIM: Mathematical Modelling and Numerical Analysis (M2AN)*.
- (3) F. Générau and É. Oudet, *Large Volume Minimizers of a Nonlocal Isoperimetric Problem: Theoretical and Numerical Approaches*, *SIAM Journal on Mathematical Analysis (SIMA)*, **50.3**, 2018, 3427–3450.
- (4) L. Métivier, R. Brossier, Q. Mérigot, É. Oudet, and J. Virieux, *Increasing the robustness and applicability of full waveform inversion: an optimal transport distance strategy*, *The Leading Edge*, 2016, 35.12, 1060–1067.
- (5) E. Mainini, M. Monteverde, É. Oudet, D. Percivale, *Newton’s aerodynamic for non convex bodies*, accepted for publication in *Rendiconti Lincei (European Mathematical Society Publishing)*, 2016.
- (6) A. Massaccesi, É. Oudet and B. Velichkov, *Numerical Calibration of Steiner trees*, *Applied Mathematics & Optimization*, 2017, 1–18.
- (7) P. Antunes, É. Oudet, *Numerical minimization of Dirichlet-Laplacian eigenvalues of four-dimensional geometries*, accepted for publication in *SIAM Journal on Scientific Computing (SISC)*, **39.3**, 2017, B508–B521.

¹All preprint versions of my papers can be downloaded at <http://www-ljk.imag.fr/membres/Edouard.Oudet/>

-
- (8) L. Métivier, R. Brossier, Q. Mérigot, É. Oudet and J. Virieux, *An optimal transport approach for seismic tomography: Application to 3D full waveform inversion*, accepted for publication in Inverse Problem.
 - (9) L. Métivier, R. Brossier, Q. Mérigot, É. Oudet and J. Virieux, *Measuring the distance between seismograms using optimal transport : Application to full waveform inversion*, accepted for publication in Geophysical Journal International.
 - (10) B. Bogosel, É. Oudet, *Partitions of Minimal Length on Manifolds*, accepted for publication in Experimental Mathematics.
 - (11) G. Buttazzo, É. Oudet, B. Velichkov, *A free boundary problem arising in PDE optimization*, accepted for publication in Calculus of Variations and Partial Differential Equations.
 - (12) B. Bogosel, É. Oudet, *Qualitative and numerical analysis of a spectral problem with perimeter constraint*, SIAM Journal on Control and Optimization (SICON), **54.1**, 2016, 317–340.
 - (13) Q. Mérigot, É. Oudet, *Discrete optimal transport : complexity, geometry and applications*, Discrete and Computational Geometry, **55.2**, 2016, 263–283.
 - (14) J.-D. Benamou, G. Carlier, Q. Mérigot and É. Oudet, *Discretization of functionals involving the Monge-Ampere operator*, Numerische Mathematik, 2015, 1–26.
 - (15) E. Bretin, S. Masnou and É. Oudet, *Phase-field approximations of the Willmore functional and flow*, Numerische Mathematik, **131.1**, 2015, 115–171.
 - (16) G. Carlier, A. Oberman and É. Oudet *Numerical methods for matching for teams and Wasserstein barycenters*, ESAIM: Mathematical Modelling and Numerical Analysis (M2AN), **49.6**, 2015, 1621–1642.
 - (17) Q. Mérigot, É. Oudet, *Handling convexity-like constraints in variational problems*, SIAM Journal on Numerical Analysis (SINUM), **52.5**, 2014, 2466–2487.
 - (18) B. Osting, C. White and É. Oudet, *Minimal Dirichlet energy partitions for graphs*, SIAM Journal on Scientific Computing (SISC), **36.4**, 2014, 1635–1651.
 - (19) N. Papadakis, G. Peyre and É. Oudet, *Optimal Transport with Proximal Splitting*, SIAM Journal on Imaging Sciences (SIIMS), **7.1** (2014), 212–238.
 - (20) É. Oudet, *Numerical shape optimisation under width constraint*, Discrete and Computational Geometry, **49.2**, (2013), 411–428.
 - (21) F. Santambrogio, É. Oudet, *A Modica-Mortola approximation for branched transport and applications*, Archive for Rational Mechanics and Analysis, **201.1** (2011), 115–142.
 - (22) E. Bretin, J.-O. Lachaud, É. Oudet, *Regularization of discrete contour by Willmore energy*, Journal of Mathematical Imaging and Vision, **40.2** (2011), 214–229.
 - (23) É. Oudet, *Approximation of partitions of least perimeter by Γ -convergence : around Kelvin’s conjecture*, Experimental Mathematics, **20.3** (2011), 260–270.
 - (24) I. Ionescu, É. Oudet, *Discontinuous velocity domain splitting in limit analysis*, International Journal of Solids and Structures, **47.10** (2010), 1459–1468.
 - (25) B. Bourdin, D. Bucur, É. Oudet, *Optimal partition for eigenvalues*, SIAM Journal on Scientific Computing, **31.6** (2009), 4100–4114.
 - (26) G. Buttazzo, C. Jimenez, É. Oudet, *An optimization problem for mass transportation with congested dynamics*, SIAM Journal on Control and Optimization, **48** (2009), 1961–1976.

-
- (27) D. Bucur, I. Durus, É. Oudet, *The conductivity eigenvalue problem*, Control and Cybernetics, **37.4** (2008), 811–829.
 - (28) M. Belloni, É. Oudet, *Minimal gap between $\Lambda_2(\Omega)$ and $\Lambda_\infty(\Omega)$ in a class of convex domain*, Journal of convex Analysis, **15** (2008), 507–521.
 - (29) É. Oudet, M. O. Rieger, *Local minimizers of functionals with multiple volume constraints*, ESAIM COCV, **14** (2008), 780–794.
 - (30) R. Hassani, I. R. Ionescu, É. Oudet, *Critical friction and wedged configurations: A genetic algorithm approach*, Internat. J. Solids Structures, **44** (2007), 6187–6200.
 - (31) T. Bayen, T. Lachand-Robert, É. Oudet, *Analytic parametrization and volume minimization of three dimensional bodies of constant width*, Archive for Rational Mechanics and Analysis, **186** (2007), 225–249.
 - (32) T. Lachand-Robert, É. Oudet, *Bodies of constant width in arbitrary dimension*, Math. Nachrichten, **280** (2007), 740–750.
 - (33) T. Lachand-Robert, É. Oudet, *Minimizing within convex bodies using a convex hull method*, SIAM Journal on Optimization, **16.2** (2006), 368–379.
 - (34) E. Sonnendruc, F. Filbet, A. Friedman, É. Oudet, J.-L. Vay, *Vlasov simulations of beams with a moving grid*, Computer Physics Communications, **164** (2004), 390–395.
 - (35) É. Oudet, *Numerical minimization of eigenmodes of a membrane with respect to the domain*, ESAIM COCV, **10** (2004), 315–335.
 - (36) G. Buttazzo, É. Oudet, E. Stepanov, *Optimal transportation problems with free Dirichlet regions*, "Variational Methods for Discontinuous Structures", Cernobio 2001, Progress in Non-Linear Differential Equations, Birkhauser Verlag (2002), 41–65.
 - (37) A. Henrot, É. Oudet, *Minimizing the second eigenvalue of the Laplace operator with Dirichlet boundary conditions*, Archive for Rational Mechanics and Analysis, **169** (2003), 73–87.

Other articles ²

- (1) N. Lebbe, C. Dapogny, É. Oudet, K. Hassan and A. Glière, *Robust shape and topology optimization of nanophotonic devices using the level set method*, submitted.
- (2) G. Alberti, G. Buttazzo, S. Guarino Lo Bianco and É. Oudet, *Optimal one-dimensional reinforcement for elastic membranes*, submitted.
- (3) M. Bonafini and É. Oudet, *A convex approach to the Gilbert-Steiner problem*, submitted.
- (4) A. Henrot, É. Oudet, *Le stade ne minimise pas λ_2 parmi les ouverts convexes du plan*, C. R. Acad. Sci. Paris Ser. I Math., **332** (2001), 417–422.
- (5) J. Haristoy, É. Oudet, *Autour du septième problème de Hilbert: Une excursion en transcendance*, l'Ouvert, **107**, p39–54.
- (6) A. Berger, É. Oudet, *A new global approach for spectral shape optimization problems*.

²All preprint versions of my papers can be downloaded at <http://www-ljk.imag.fr/membres/Edouard.Oudet/>