Yann Brenier

Curriculum vitae

Born January 1st 1957, Saint-Chamond, Loire, France.

Département de Mathématiques et Applications, UMR 8553,
Ecole Normale Supérieure, 75005 Paris (since 01-01-2018).

$yann.brenier@ens.fr$

$http://www.math.ens.fr/\sim brenier/$

Formation

Baccalauréat 1973,
1er et 2ème cycles de mathématiques à Paris 6 (1973-1977),
Ecole des ponts et DEA d'analyse numérique (1977-1979),
Doctorat de 3ème cycle, Paris-Dauphine, 1982,
Doctorat ès Sciences en 1986, Université Paris-Dauphine,

Advisor : Guy Chavent, jury : P.-A. Raviart, C. Bardos, B. Engquist, J.-M. Lasry, M. Schatzman, L. Tartar.

Emplois

2018- Directeur de recherches CNRS au DMA, Ecole Normale Supérieure, Paris

2012-2017- Directeur de recherches CNRS au CMLS, Ecole Polytechnique, Palaiseau.

2000-2012- Directeur de recherches CNRS, à Nice (LJAD and Fédération Doeblin), on leave from Université Paris 6 until 01-01-2005, and permanently since.

1990-2005– Professeur de l'Université Paris 6 assigned to Ecole Normale Supérieure (rue d'Ulm) from 1990 to 1997.

1986-1990– Directeur de recherches, INRIA, Rocquencourt.

1985-1986– J.R. Hedrick Assistant Professor, University of California (UCLA).

1979-1985– Researcher at INRIA (including National Service as researcher at IIMAS, Universidad Nacional Autonoma de México, 1983-1984).

Distinctions

Member of the Institute for Advanced Study (1991-1992).
Junior member of the Institut Universitaire de France (1996-2000).
Prix des annales de l'IHP (together with L. Corrias) 1999.
Sectional invited speaker at the ICM Beijing 2002.
Plenary speaker at the ICIAM Sydney 2003.
Prix Petit d'Ormoy, Carrière, Thébault, de l'Académie des Sciences, 2005.

"Lectures"

Charles Amick lectures,
University of Chicago, may 2003.
Aziz lectures,
University of Maryland, may 2006.
Lipschitz lectures,
Universität Bonn, june 2007.
Nachdiplomvorlesung,
ETH, Zurich, fall 2009.
Douglis lectures,
University of Maryland, april 2013.
Chaire de la Vallée Poussin,
Université de Louvain-la-Neuve (UCL), may 2013.
Niven lectures,
University of British Columbia (UBC), Vancouver, may 2013.
Chancellor's lectures,
University of California, Berkeley, fall 2013.
Center for Mathematical Sciences lectures,
Technion, Haifa, january 2015.
Marsden Memorial Lecture,
Ecole Polytechnique Fédérale de Lausanne, june 2015.

PhD students

Jean-David BENAMOU, PhD 1992, directeur de recherches de première classe, INRIA Paris.

Lucilla CORRIAS, PhD 1995, maître de conférences hors-classe, Université d'Evry.
Michel ROESCH, PhD 1995, Corps des Mines 1994, PSA Peugeot Citroën.
Emmanuel GRENIER, PhD 1995, professeur, Ecole Normale Supérieure de Lyon.
Alexis VASSEUR, PhD 1998, John T. Stuart III Centennial Professor, University of Texas at Austin.
Marjolaine PUEL, PhD 2001, professeur, Université de Nice Sophia-Antipolis.
Grégoire LOEPER, PhD 2003, professor, Monash University, Melbourne, Australie.
Xianglong DUAN, PhD 2017, postdoc ERC Université d'Orsay.
Aymeric BARADAT, PhD student since 2016, co-direction by Daniel Han-Kwan.

Recent invitations sept. 2012-dec. 2017

Institutes and thematic programs

-MSRI, Berkeley, program OT (Optimal transport), fall 2013, and invited professor (Chancellor's professor) of UC Berkeley.
-FIELDS Institute, Toronto, Thematic Program on Variational Problems in Physics, Economics and Geometry, fall 2014.
-BERNOULLI Center, EPFL, Lausanne, Geometric Mechanics, Variational and Stochastic Methods, april 2015.
-SCHRÖDINGER Institute (ESI), Vienna, "Nonlinear Flows" , summer 2016, and invited professor of Universität Wien.

Invitations at Oberwolfach (with talks) 2013-2017

Geophysical Fluid Dynamics (Giga, Hieber, Titi) 17-23 feb. 2013.

Classical and Quantum Mechanical Models of Many-Particle Systems (Arnold, Carlen, Desvillettes) 1-7 dec. 2013.

Material Theories (DeSimone, Luckhaus, Truskinovsky) 15-21 déc. 2013.

Calculus of variations (Brendle, De Lellis, Jerrard) 13-19 july 2014.

Variational Methods for Evolution (Ambrosio, Mielke, Peletier, Savaré) 14-20 dec. 2014.

Mathematical Aspects of Hydrodynamics (Constantin, Friedlander, Seregin, Titi) 9-15 aug. 2015.

Applications of Optimal Transportation in the Natural Sciences (Benamou, Ehrlacher, Matthes) 29 jan-4 fev. 2017.

Geophysical Fluid Dynamics (Giga, Hieber, Titi) 7-13 may 2017.

Material Theories (Conti, DeSimone, Luckhaus, Truskinovsky) july 2017.

Variational Methods for Evolution (Mielke, Peletier, Slepcev) nov. 2017.

Classical and Quantum Mechanical Models of Many-Particle Systems (Arnold, Carlen, Desvillettes) 3-9 dec. 2017.

Workshops and Conferences (sept. 2012-aug. 2016)

Variational Models and Methods for Evolution, 10-12 sept. 2012, Levico Terme.

ERC Workshop on Optimal Transportation and Applications, 5-9 nov 2012, Centro De Giorgi, Pisa.

International Conference on Fluids and Variational Methods, 28 jan.-1 fev. 2013, Leipzig.

Semaine thématique "Transport Optimal", 31 march-4 april 2014, Toulouse.

Conference on Geometry and Fluids, 7-11 april 2014, Oxford.

Conférence en l'honneur d'Ivar Ekeland, 18-20 june 2014, Paris.

Advances in Mathematical Fluid Mechanics, stochastic and deterministic methods, 30 june-5 july 2014, Lisbonne.

Journées de Mathématiques Appliquées, Conférence en l'honneur de Laurence Halpern, 20-22 jan. 2015, Institut Henri Poincaré, Paris.

New Trends in Optimal Transport, 2-6 march 2015, Bonn.

Workshop Classic and Stochastic Geometric Mechanics, 8-11 june 2015, EPFL, Lausanne.

Transport, Fluids and Mixing, 19-24 july 2015, Levico Terme.

Around Schrödinger equations", 3-5 aug., Wolfgang Pauli Institute, Vienna.

Frontiers of Applied and Computational Mathematics Celebrating Professor Björn Engquist's 70th Birthday, 7-9 aug. 2015, Beijing, Chine.

International Conference on Stochastic Analysis and Applications, 19-23 oct. 2015, Hammamet, Tunisie.

Analysis in Lyon, à l'occasion du doctorat Doctorat Honoris Causa de l'ENS de Lyon à Luigi Ambrosio, 26-30 oct. 2015, Lyon.

Vlasov-Poisson equations for plasmas and cosmology, 7-12 dec. 2015, Wolfgang Pauli Institute, Vienna.

Euler and Navier-Stokes Equations and Connected Topics, 14-18 dec. 2015, Wolfgang Pauli Institute, Vienna.

Advances in kinetic and fluid dynamics transport, in honor of Claude Bardos, 22-26 fev. 2016, Austin, Texas.

Entropy methods, dissipative systems, and applications, 13-17 june 2016, Erwin Schrödinger Institute, Vienna.

Recent publications 2013-2018

References

[1] with Xianglong Duan, From conservative to dissipative systems through quadratic change of time, with application to the curve-shortening flow. Arch. Ration. Mech. Anal. 227 (2018) 545-565.

[2] Geometric diffusions of 1-currents. Ann. Fac. Sci. Toulouse Math. (6) 26 (2017) 831-846.

[3] (chapter of book) Some variational and stochastic methods for the Euler equations of incompressible fluid dynamics and related models. Stochastic geometric mechanics, 169189, Springer Proc. Math. Stat., 202, 2017.

[4] A Double Large Deviation Principle for Monge-Ampère Gravitation, Bulletin of the Institute of Mathematics Academia Sinica New Series, 11 (2016) 23-41.

[5] Connections between optimal transport, combinatorial optimization and hydrodynamics. ESAIM Math. Model. Numer. Anal. 49 (2015) 1593-1605.

[6] Optimal transportation of particles, fluids and currents, Advanced Studies in Pure Mathematics 67 (2015) 59-85.

[7] Topology-preserving diffusion of divergence-free vector fields and magnetic relaxation, Communications in Mathematical Physics 330 (2014) 757-770.

[8] Approximation of a simple Navier-Stokes model by monotonic rearrangement, Discrete and continuous dynamical systems 34 (2014) 1285-1300.

[9] Rearrangement, convection, convexity and entropy, Phil. Trans. Royal Soc. A 371 (2013) .

[10] avec W. Gangbo, G. Savaré, M. Westdickenberg, Sticky particle dynamics with interactions. J. Math. Pures Appl. (9) 99 (2013) 577-617.

[11] Remarks on the Minimizing Geodesic Problem in Inviscid Incompressible Fluid Mechanics, Calc. Var. Partial Differential Equations 47 (2013) 55-64.

Selected list of publications

[12] A modified least action principle allowing mass concentrations for the early universe reconstruction problem, Confluentes Mathematici 3 (2011) 361-385.

[13] avec C. De Lellis, L. Szekelyhidi, Weak-Strong Uniqueness for Measure-Valued Solutions, Comm. Math. Physics, Comm. Math. Phys. 305 (2011) 351-361.

[14] avec F. Otto, Ch. Seis, Upper bounds on coarsening rates in demixing binary viscous liquids, SIAM J. Math. Anal. 43 (2011) 114-134.

[15] Hidden convexity in some nonlinear PDEs from geometry and physics, Journal of Convex Analysis 17 (2010), No. 3-4, 945–959

[16] On the hydrostatic and Darcy limits of the convective Navier-Stokes equations, Chin. Ann. Math. Ser. B 30 (2009) 683-696,

[17] avec M.J. Cullen, Rigorous derivation of the x-z semigeostrophic equations. Commun. Math. Sci. 7 (2009), no. 3, 779-784.

[18] Optimal Transport, Convection, Magnetic Relaxation and Generalized Boussinesq equations, J. Nonlinear Sci. 19 (2009), no. 5, 547-570.

[19] L2 formulation of multidimensional scalar conservation laws, Archive Rat. Mech. Analysis 193 (2009) 1-19.

[20] avec Nicolas Besse, Florent Berthelin, Pierre Bertrand, The multi-water-bag equations for collisionless kinetic modeling, Kinetic and Related Models, 2 (2009) 39-80.

[21] Generalized solutions and hydrostatic approximation of the Euler equations, Physica D 237 (2008) 1982-1988.

[22] Non relativistic strings may be approximated by relativistic strings, Methods and Applications of Analysis 12 (2005) 153-16.

[23] avec Wen-An Yong, Derivation of particle, string, and membrane motions from the Born-Infeld electromagnetism, J. Math. Phys. 46 (2005) 6, 062305.

[24] avec François Bolley et Grégoire Loeper, Contractive metrics for scalar conservation laws, J. Hyperbolic Differ. Equ. 2 (2005) 91-107.

[25] Order preserving vibrating strings and applications to electrodynamics and magnetoydrodynamics, Methods Appl. Anal. 11 (2004) 515-532.

[26] avec Grégoire Loeper, A geometric approximation to the Euler equations: the Vlasov-Monge-Ampère system, Geom. Funct. Anal. 14 (2004) 1182-1218.

[27] Hydrodynamic Structure of the augmented Born-Infeld equations, Arch. Ration. Mech. Anal. 172 (2004) 65-91.

[28] Deformations of 2D fluid motions using 3D Born-Infeld equations, Monatsh. Math. 142 (2004) 113-122.

[29] avec Roberto Natalini et Marjolaine Puel, Relaxation of the incompressible Navier-Stokes equations, Proc. Amer. Math. Soc. 132 (2004) 1021-1028.

[30] avec U. Frisch, M. Henon, G. Loeper, S. Matarrese, R. Mohayaee, A. Sobolevskii, Reconstruction of the early Universe as a convex optimization problem, Mon. Not. Roy. Astron. Soc. 346 (2003) 501-524.

[31] avec Norbert Mauser et Marjolaine Puel, Derivation of e-MHD from the Vlasov-Maxwell system, Commun. Math. Sci. 1 (2003) 437-447.

[32] Remarks on the derivation of the hydrostatic Euler equations, Bull. Sci. Math. 127 (2003) 585-595.

[33] Harmonicity up to rearrangement and isothermal gas dynamics, Commun. Math. Sci. 1 (2003) 13-29.

[34] avec Wilfrid Gangbo, L^p approximation of maps by diffeomorphisms, Calc. Var. Partial Differential Equations 16 (2003), no. 2, 147-164.

[35] avec Marjolaine Puel, Optimal multiphase transportation with prescribed momentum, ESAIM Control Optim. Calc. Var. 8 (2002), 287-343.

[36] avec Jean-David Benamou, Mixed L^2-Wasserstein optimal mapping between prescribed density functions, J. Optim. Theory Appl. 111 (2001), no. 2, 255–271.

[37] Derivation of the Euler equations from a caricature of Coulomb interaction, Comm. Math. Physics. 212 (2000) 93-104.

[38] Convergence of the Vlasov-Poisson system to the incompressible Euler equations, Comm. Partial Differential Equations 25 (2000) 737-754.

[39] avec Doron Levy, Dissipative béavior of some fully non-linear KdV-type equations, Phys. D 137 (2000) 277-294.

[40] avec Jean-David Benamou, A Computational Fluid Mechanics solution to the Monge-Kantorovich mass transfer problem, Numer. Math. 84 (2000) 375-393.

[41] avec Bouchut, Cortes et Ripoll, A hierarchy of models for two-phase flows, J. Nonlinear Sci. 10 (2000) 639-660.

[42] Homogeneous hydrostatic flows with convex velocity profiles, Nonlinearity 12 (1999) 495 - 512.

[43] Minimal geodesics on groups of volume-preserving maps and generalized solutions of the Euler equations, Comm. Pure and Applied Maths, 52 (1999) 411-452.

[44] avec Emmanuel Grenier, Sticky particles and scalar conservation laws, SIAM J. Numer. Anal. 35 (1998) 2317-2328.

[45] avec Jean-David Benamou, Weak existence for the semi-geostrophic equations formulated as a coupled Monge-Ampère transport problem, SIAM J. Appl. Math. 58 (1998) 1450-1461.

[46] avec Lucilla Corrias, A kinetic formulation for multi-branch entropy solutions of scalar conservation laws, Ann. Inst. H. Poincaré Anal. Non Linéaire 15 (1998) 169-190.

[47] A homogenized model for vortex sheets, Arch. Rational Mech. Anal. 138 (1997) 319-353.

[48] avec G.-H. Cottet, Convergence of particle methods with random rezoning for the 2-D Euler and Navier-Stokes equations, (1995), SIAM J. of Num. Analysis 32 (1995) 1080-1097.

[49] The dual least Action Problem for an incompressible fluid, Archive for Rat. Mech. 122 (1993) 323-351.

[50] Polar factorization and monotone rearrangement of vector valued functions, Comm. Pure and Appl. Math. 64 (1991) 375-417.

[51] avec J.Jaffré, Upstream weighting in conservation laws arising in reservoir simulations, SIAM J. Num. Analysis 28 (1991) 685-696.

[52] Une méthode particulaire pour les équations non linéaires de diffusion convection en dimension un. J. Comput. Appl. Math. 31 (1990), 35-56.

[53] The least Action Principle and the related concept of generalized flows for incompressible inviscid fluids, J. of the A.M.S, 2 (1989) 225-255.

[54] A combinatorial algorithm for the Euler equations of incompressible fluids, Comp. Meth. in Appl. Mech. and Engineering 75 (1989) 325-332.

[55] Un algorithme rapide pour le calcul de transformées de Legendre discrètes, C. R. Acad. Sci. Paris 308 (1989) 587-589.

[56] avec S.Osher, The one-sided Lipschitz condition for convex conservation laws, SIAM J. Num. Analysis 25 (1988) 8-28.

[57] Averaged multivalued solutions for scalar conservation laws, SIAM J. Num. Analysis 21 (1984) 1013-1037.

[58] Résolution d'équations d'évolution quasilinéaires en dimension N d'espace à l'aide d'équations linéaires en dimension N+1, J.Diff.Equ. 50 (1983) 375-390.

[59] Une équation homologique avec contrainte, C. R. Acad. Sci. Paris 295 (1982) 103-106.

Chapters of books

[60] Hilbertian approaches to some nonlinear conservation laws, Nonlinear partial differential equations and hyperbolic wave phenomena, 19-35, Contemp. Math., 526, Amer. Math. Soc., Providence, RI, 2010.

[61] Topics on hydrodynamics and volume preserving maps, Handbook of mathematical fluid dynamics, Vol. II, 55-86, North-Holland, Amsterdam, 2003.

[62] Extended Monge-Kantorovich theory. Optimal transportation and applications, 91-121, Lecture Notes in Math., 1813, Springer, Berlin, 2003.

[63] Averaged multivalued solutions and time discretization for conservation laws, Lect. in Appl. Math. 22 (1985) 41-55.