

Some references for the Granada course

Luigi Ambrosio*
Scuola Normale Superiore

Surveys, lectures, books on Optimal transportation.

[30], [3], [62].
[5] (Part II), [8], [52], [53], [63], [64].

Convex functions, optimal transport maps and their regularity.

[2], [32].
[14], [15], [21], [7], [6], [31], [33], [34], [35], [38], [57], [60], [61], [43].
[17], [19], [18], [20].

Metric and differentiable side of optimal transportation.

[12], [42], [50], [49], [39], [40], [59].

Evolution problems, Gradient flows, error estimates.

[5] (Part I), [11], [13], [16], [26], [28], [27], [29], [37], [41], [51], [45], [44], [56], [55], [54].

Evolution problems in $\mathcal{P}_2(\mathbf{R}^n)$.

[1], [22], [23], [24], [25], [36], [47], [48], [49], [58], [46], [9], [10], [4],

References

- [1] M. AGUEH, *Existence of solutions to degenerate parabolic equations via the Monge-Kantorovich theory*, Adv. Differential Equations, 10 (2005), pp. 309–360.
- [2] G. ALBERTI AND L. AMBROSIO, *A geometrical approach to monotone functions in \mathbf{R}^n* , Math. Z., 230 (1999), pp. 259–316.
- [3] L. AMBROSIO, *Lecture notes on optimal transport problem*, in Mathematical aspects of evolving interfaces, CIME summer school in Madeira (Pt), P. Colli and J. Rodrigues, eds., vol. 1812, Springer, 2003, pp. 1–52.
- [4] L. AMBROSIO AND W. GANGBO, *Hamiltonian ODE's in the Wasserstein space of probability measures*, To appear in Comm. Pure Appl. Math., (2008).

*l.ambrosio@sns.it

- [5] L. AMBROSIO, N. GIGLI, AND G. SAVARÉ, *Gradient flows in metric spaces and in spaces of probability measures*, Birkhäuser, 2005.
- [6] L. AMBROSIO, B. KIRCHHEIM, AND A. PRATELLI, *Existence of optimal transport maps for crystalline norms*, Duke Mathematical Journal, to appear, (2003).
- [7] L. AMBROSIO AND A. PRATELLI, *Existence and stability results in the L^1 theory of optimal transportation*, in Optimal transportation and applications, Lecture Notes in Mathematics, L. Caffarelli and S. Salsa, eds., vol. 1813, Springer, 2003, pp. 123–160.
- [8] L. AMBROSIO AND G. SAVARÉ, *Gradient flows of probability measures*, in Handbook of Evolution Equations (III), Elsevier, 2006.
- [9] L. AMBROSIO, G. SAVARÉ, AND L. ZAMBOTTI, *Existence and stability for Fokker-Planck equations with log-concave reference measure*, ArXiv Mathematics e-prints, (2007).
- [10] L. AMBROSIO AND S. SERFATY, *A gradient flow approach to an evolution problem arising in superconductivity*, to appear on Comm. Pure Appl. Math., (2007).
- [11] C. BAIocchi, *Discretization of evolution variational inequalities*, in Partial differential equations and the calculus of variations, Vol. I, F. Colombini, A. Marino, L. Modica, and S. Spagnolo, eds., Birkhäuser Boston, Boston, MA, 1989, pp. 59–92.
- [12] J.-D. BENAMOU AND Y. BRENIER, *A computational fluid mechanics solution to the Monge-Kantorovich mass transfer problem*, Numer. Math., 84 (2000), pp. 375–393.
- [13] P. BÉNILAN, *Solutions intégrales d'équations d'évolution dans un espace de Banach*, C. R. Acad. Sci. Paris Sér. A-B, 274 (1972), pp. A47–A50.
- [14] Y. BRENIER, *Décomposition polaire et réarrangement monotone des champs de vecteurs*, C. R. Acad. Sci. Paris Sér. I Math., 305 (1987), pp. 805–808.
- [15] ———, *Polar factorization and monotone rearrangement of vector-valued functions*, Comm. Pure Appl. Math., 44 (1991), pp. 375–417.
- [16] H. BRÉZIS, *Opérateurs maximaux monotones et semi-groupes de contractions dans les espaces de Hilbert*, North-Holland Publishing Co., Amsterdam, 1973. North-Holland Mathematics Studies, No. 5. Notas de Matemática (50).
- [17] L. A. CAFFARELLI, *Some regularity properties of solutions of Monge Ampère equation*, Comm. Pure Appl. Math., 44 (1991), pp. 965–969.
- [18] ———, *Boundary regularity of maps with convex potentials*, Comm. Pure Appl. Math., 45 (1992), pp. 1141–1151.
- [19] ———, *The regularity of mappings with a convex potential*, J. Amer. Math. Soc., 5 (1992), pp. 99–104.

- [20] ———, *Monotonicity properties of optimal transportation and the FKG and related inequalities*, Comm. Math. Phys., 214 (2000), pp. 547–563.
- [21] L. A. CAFFARELLI, M. FELDMAN, AND R. J. MCCANN, *Constructing optimal maps for Monge’s transport problem as a limit of strictly convex costs*, J. Amer. Math. Soc., 15 (2002), pp. 1–26 (electronic).
- [22] E. A. CARLEN AND W. GANGBO, *Constrained steepest descent in the 2-Wasserstein metric*, Ann. of Math. (2), 157 (2003), pp. 807–846.
- [23] ———, *Solution of a model Boltzmann equation via steepest descent in the 2-Wasserstein metric*, Arch. Ration. Mech. Anal., 172 (2004), pp. 21–64.
- [24] J. A. CARRILLO, R. J. MCCANN, AND C. VILLANI, *Kinetic equilibration rates for granular media and related equations: entropy dissipation and mass transportation estimates*, Rev. Mat. Iberoamericana, 19 (2003), pp. 971–1018.
- [25] ———, *Contractions in the 2-Wasserstein length space and thermalization of granular media*, Arch. Ration. Mech. Anal., 179 (2006), pp. 217–263.
- [26] M. G. CRANDALL AND T. M. LIGGETT, *Generation of semi-groups of nonlinear transformations on general Banach spaces*, Amer. J. Math., 93 (1971), pp. 265–298.
- [27] E. DE GIORGI, *New problems on minimizing movements*, in Boundary Value Problems for PDE and Applications, C. Baiocchi and J. L. Lions, eds., Masson, 1993, pp. 81–98.
- [28] E. DE GIORGI, A. MARINO, AND M. TOSQUES, *Problems of evolution in metric spaces and maximal decreasing curve*, Atti Accad. Naz. Lincei Rend. Cl. Sci. Fis. Mat. Natur. (8), 68 (1980), pp. 180–187.
- [29] M. DEGIOVANNI, A. MARINO, AND M. TOSQUES, *Evolution equations with lack of convexity*, Nonlinear Anal., 9 (1985), pp. 1401–1443.
- [30] L. C. EVANS, *Partial differential equations and Monge-Kantorovich mass transfer*, in Current developments in mathematics, 1997 (Cambridge, MA), Int. Press, Boston, MA, 1999, pp. 65–126.
- [31] L. C. EVANS AND W. GANGBO, *Differential equations methods for the Monge-Kantorovich mass transfer problem*, Mem. Amer. Math. Soc., 137 (1999), pp. viii+66.
- [32] L. C. EVANS AND R. F. GARIEPY, *Measure theory and fine properties of functions*, Studies in Advanced Mathematics, CRC Press, Boca Raton, FL, 1992.
- [33] D. FEYEL AND A. S. ÜSTÜNEL, *Measure transport on Wiener space and the Girsanov theorem*, C. R. Math. Acad. Sci. Paris, 334 (2002), pp. 1025–1028.
- [34] D. FEYEL AND A. S. ÜSTÜNEL, *Monge-Kantorovich measure transportation and Monge-Ampère equation on Wiener space*, Probab. Theory Related Fields, 128 (2004), pp. 347–385.

- [35] W. GANGBO AND R. J. MCCANN, *The geometry of optimal transportation*, Acta Math., 177 (1996), pp. 113–161.
- [36] R. JORDAN, D. KINDERLEHRER, AND F. OTTO, *The variational formulation of the Fokker-Planck equation*, SIAM J. Math. Anal., 29 (1998), pp. 1–17 (electronic).
- [37] J. JOST, *Nonpositive curvature: geometric and analytic aspects*, Lectures in Mathematics ETH Zürich, Birkhäuser Verlag, Basel, 1997.
- [38] M. KNOTT AND C. S. SMITH, *On the optimal mapping of distributions*, J. Optim. Theory Appl., 43 (1984), pp. 39–49.
- [39] S. LISINI, *Characterization of absolutely continuous curves in Wasserstein spaces*, Calc. Var. Partial Differential Equations, 28 (2007), pp. 85–120.
- [40] J. LOTT AND C. VILLANI, *Ricci curvature for metric-measure spaces via optimal transport*, ArXiv Mathematics e-prints, (2004).
- [41] U. F. MAYER, *Gradient flows on nonpositively curved metric spaces and harmonic maps*, Comm. Anal. Geom., 6 (1998), pp. 199–253.
- [42] R. J. MCCANN, *A convexity principle for interacting gases*, Adv. Math., 128 (1997), pp. 153–179.
- [43] ———, *Polar factorization of maps on riemannian manifolds*, Geometric and Functional Analysis, 11 (2001), pp. 589–608.
- [44] R. H. NOCHETTO AND G. SAVARÉ, *Nonlinear evolution governed by accretive operators in Banach spaces: error control and applications*, Math. Models Methods Appl. Sci., 16 (2006), pp. 439–477.
- [45] R. H. NOCHETTO, G. SAVARÉ, AND C. VERDI, *A posteriori error estimates for variable time-step discretizations of nonlinear evolution equations*, Comm. Pure Appl. Math., 53 (2000), pp. 525–589.
- [46] S.-I. OHTA, *Gradient flows on wasserstein spaces over compact alexandrov spaces*, tech. report, Universität Bonn, 2007.
- [47] F. OTTO, *Doubly degenerate diffusion equations as steepest descent*, Manuscript, (1996).
- [48] ———, *Evolution of microstructure in unstable porous media flow: a relaxational approach*, Comm. Pure Appl. Math., 52 (1999), pp. 873–915.
- [49] ———, *The geometry of dissipative evolution equations: the porous medium equation*, Comm. Partial Differential Equations, 26 (2001), pp. 101–174.
- [50] F. OTTO AND C. VILLANI, *Generalization of an inequality by Talagrand and links with the logarithmic Sobolev inequality*, J. Funct. Anal., 173 (2000), pp. 361–400.

- [51] G. PERELMAN AND A. PETRUNIN, *Quasigeodesics and gradient curves in alexandrov spaces*, manuscript, (1992).
- [52] S. T. RACHEV AND L. RÜSCHENDORF, *Mass transportation problems. Vol. I*, Probability and its Applications, Springer-Verlag, New York, 1998. Theory.
- [53] ———, *Mass transportation problems. Vol. II*, Probability and its Applications, Springer-Verlag, New York, 1998. Applications.
- [54] R. ROSSI, A. MIELKE, AND G. SAVARÉ, *A metric approach to a class of doubly nonlinear evolution equations and applications*, to appear in Ann. Sc. Norm. Sup. Pisa, (2008).
- [55] R. ROSSI AND G. SAVARÉ, *Gradient flows of non convex functionals in Hilbert spaces and applications*, ESAIM Control Optim. Calc. Var., 12 (2006), pp. 564–614 (electronic).
- [56] J. RULLA, *Error analysis for implicit approximations to solutions to Cauchy problems*, SIAM J. Numer. Anal., 33 (1996), pp. 68–87.
- [57] L. RÜSCHENDORF, *On c-optimal random variables*, Statist. Probab. Lett., 27 (1996), pp. 267–270.
- [58] G. SAVARÉ, *Gradient flows and diffusion semigroups in metric spaces under lower curvature bounds*, C. R. Math. Acad. Sci. Paris, 345 (2007), pp. 151–154.
- [59] K.-T. STURM, *On the geometry of metric measure spaces. I*, Acta Math., 196 (2006), pp. 65–131.
- [60] V. N. SUDAKOV, *Geometric problems in the theory of infinite-dimensional probability distributions*, Proc. Steklov Inst. Math., (1979), pp. i–v, 1–178. Cover to cover translation of Trudy Mat. Inst. Steklov **141** (1976).
- [61] N. S. TRUDINGER AND X.-J. WANG, *On the Monge mass transfer problem*, Calc. Var. Partial Differential Equations, 13 (2001), pp. 19–31.
- [62] C. VILLANI, *Optimal transportation, dissipative PDE's and functional inequalities*, in Optimal transportation and applications (Martina Franca, 2001), vol. 1813 of Lecture Notes in Math., Springer, Berlin, 2003, pp. 53–89.
- [63] ———, *Topics in optimal transportation*, vol. 58 of Graduate Studies in Mathematics, American Mathematical Society, Providence, RI, 2003.
- [64] ———, *Optimal transport, old and new*, Springer Verlag, 2008.