CURRICULUM VITAE ET STUDIORUM

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Education

- 06/07/2001 Maturità scientifica, votazione 100/100 con encomio.

- 26/07/2006: Laurea Magistrale in Ingegneria Matematica, Politecnico di Milano. Votazione: 110 e Lode/110.

- dal 30/07/2006 al 02/09/2006: Scuola Matematica Interuniversitaria di Perugia. Attended courses: Analisi Funzionale (mark: **A**), Analisi complessa (mark: **A**).

- 09/04/2010: PhD in Mathematics, Scuola Normale Superiore, Pisa. Votazione: 70 e Lode/70.

Current position: Assegnista di ricerca, Dipartimento di Matematica 'F. Casorati', Università degli Studi di Pavia

Theses

- Tesi di Laurea Triennale in Ingegneria Matematica: *Metodi asintotici per equazioni differenziali singolari.* Politecnico di Milano. Advisor: prof. Paolo Biscari

- Tesi di Laurea Magistrale in Ingegneria Matematica: *Stabilità di semigruppi lineari astratti generati da equazioni integro-differenziali del primo ordine.* Politecnico di Milano. Advisor: prof. Vittorino Pata. Controrelatore: prof. Stefano Mortola.

- PhD Thesis: *Some applications of optimal transport theory to evolution and shape optimization problems.* Scuola Normale Superiore, Pisa. Advisor: prof. Luigi Ambrosio.

Publications

(1) Vladimir V. Chepyzhov, Edoardo Mainini, Vittorino Pata, *Stability of abstract linear semigroups arising from heat conduction with memory*, Asymp. Anal. 50, **3-4**, 269–291 (2006).

(2) Edoardo Mainini, Gianluca Mola, *Exponential and polynomial decay for first order linear Volterra evolution equations*, Quart. Appl. Math. **67**, 93-111 (2009).

(3) Edoardo Mainini, *A global uniqueness result for an evolution problem arising in superconductivity* , Boll. Unione Mat. Ital. (9) **II** (2009), no.2, 509–528.

(4) Giuseppe Buttazzo, Edoardo Mainini, Eugene Stepanov, *Stationary configurations for the average distance functional and related problems*, Control Cybernet. **38** (2009), no. 4A, 1107–1130.

(5) Luigi Ambrosio, Edoardo Mainini, *Infinite-dimensional porous media equations and optimal transportation* , J. Evol. Equ. **10** (2010), no. 1, 217–246.

Preprints

(6) Luigi Ambrosio, Edoardo Mainini, Sylvia Serfaty, *Gradient flow of the Chapman-Rubinstein-Schatzman model for signed vortices*, Preprint (2010).

(7) Edoardo Mainini, *Well-posedness for the hydrodynamic equations of Ginzburg-Landau vortices with opposite degrees*, Preprint (2010).

(8) Antoine Lemenant, Edoardo Mainini, *On convex sets that minimize the average distance*, Preprint (2010).

Most of the preprints are available at the web page http://cvgmt.sns.it/people/mainini/

Partecipation at Schools and Workshops

- Workshop 'Local Holomorphic Dynamics', Centro di Ricerca Matematica Ennio de Giorgi, Pisa, January 22-26, 2007.
- XVII Workshop on Calculus of Variations Levico Terme (Trento, Italy), February 4-9, 2007.

- Workshop MI-PV 2007, Differential equations and Calculus of Variations Milano (Italy), October 2007.
- Rate-Independence, Homogenization and Multiscaling, Centro di Ricerca Matematica Ennio de Giorgi, Pisa, November 15-17, 2007.
- XVIII Workshop on Calculus of Variations Levico Terme (Trento, Italy), February 11-15, 2008.
- Evolution equations in pure and applied sciences, Symposium in honour of Aldo Belleni Morante, Firenze, April 18-19. 2008.
- Singularities in nonlinear evolution phenomena and applications. Satellite Conference of the 5th ECM Partially supported by: GNAMPA - INdAM and MIUR-PRIN Project. May 26-30, 2008.
- C.I.M.E. Summer Course, NONLINEAR PDE's and APPLICATIONS, Cetraro (Cosenza), Italy, June 22 - 28, 2008.
- GNAMPA school on optimal transportation, geometry and functional inequalities, Pisa, October 28-31, 2008.
- Conference on optimal transportation and applications, 4th edition, Pisa, November 3-6, 2008.
- XIX Workshop on Calculus of Variations, Levico Terme (Trento, Italy), February 9-13, 2009.
- International School of Mathematics "Guido Stampacchia", 51th Workshop: Variational Analysis and Applications, Erice (TP), Italy, May 9 - 17, 2009.
- Workshop: Optimal Transportation Theory and Applications, Institut Fourier - Grenoble (France), June 28 - July 3, 2009.
- Recent Advances in Optimal Transportation and Applications, Université de Nice Sophia-Antipolis, France, October 28 - 30, 2009.
- XX Workshop on Calculus of Variations, Levico Terme (Trento, Italy), February 21 -2 6, 2010.
- Workshop: Optimization and stochastic methods for spatially distributed information. St.-Petersburg University of Information Technologies, Mechanics and Optics (University ITMO). Euler International Mathematical Institute. St.-Petersburg, Russia, May 10-16, 2010
- GNAMPA - ERC SUMMER SCHOOL: Analytic Techniques for Geometric and Functional Inequalities. Ischia (Italy), June 13-18, 2010

Invited speaker

- 15/09/2008, St.-Petersburg,
  V.I. Smirnov Seminar on Mathematical Physics, at V.A. Steklov Mathematical Institute (St.-Petersburg, Fontanka 27).

- 04/12/2008, Toulon (France),
  les séminaires de l'Institut de Mathématiques (Analyse et Calcul), Laboratoire IMATH U.F.R. des Sciences et Techniques, Universite du Sud-Toulon-Var, La Garde Cedex.

- 15/01/2009, Paris,
  Séminaires et Groupes de travail du Laboratoire Jacques-Louis Lions, Universite Pierre et Marie Curie - ens, laboratoire Jacques-Louis Lions - dma.

- 12/02/2009, Levico Terme (Trento, Italy),
  XXIX Workshop on Calculus of Variations .

- 29/04/2009, Pisa,
  Seminario di Calcolo delle Variazioni, Dipartimento di Matematica, Università di Pisa.

- 13/05/2009 Erice (TP, Italy),
  International School of Mathematics "Guido Stampacchia", 51th Workshop: Variational Analysis and Applications.

- 30/10/2009 Nice (France),
  Recent Advances in Optimal Transportation and Applications, Université de Nice Sophia-Antipolis.

- 11/05/2010 St.-Petersburg,
  Workshop: Optimization and stochastic methods for spatially distributed information.
  University of Information Technologies, Mechanics and Optics (University ITMO).
  Euler International Mathematical Institute.

Teaching activity

- Contract of support for didactics, Facoltà di Ingegneria, Università di Pisa. Course: Analisi Matematica II, corso di laurea in Ingegneria Civile, academic year 2007/2008, second semester.
- Tutoring activity for students of the Corso Ordinario in Matematica, Scuola Normale Superiore, Pisa (2007, 2008).
- 'Seminari didattici' for the course 'Modelli e metodi matematici II', Corso di Laurea Specialistica in Ingegneria, Università di Pavia (academic year 2009/2010, second semester).

Visits

Visitor at the Laboratoire Jacques-Louis Lions, Universite Pierre et Marie Curie, Paris, from 08/01/2009 to 07/02/2009.

Research Interests

- Semigroups of linear operators, Evolution equations with memory, Stability Theory
- Calculus of Variations and Optimal Control, Shape Optimization

- Optimal Transportation, Gradient Flows in metric spaces and applications to Partial Differential Equations

Research groups

- 2006, Research group in Evolution Equations, Dipartimento di Matematica, Politecnico di Milano
- 2007, INDAM group GNAMPA, sezione Equazioni Differenziali e Sistemi Dinamici.
- 2008, 2009 member of the research team of Calculus of Variation and Geometric Measure Theory (CVGMT), Scuola Normale Superiore in Pisa (Italy).

Current research

- In a work in progress in collaboration with José A. Carrillo (Universitat Autònoma de Barcelona), Stefano Lisini and Giuseppe Savaré (Università degli Studi di Pavia), we consider the so called 'interaction energy functional'. It describes a system of particles subject to attractive-repulsive forces. We consider the corresponding continuum model and we study the related evolution equation, which can be seen as the 'gradient flow' of the energy. In the optimal transportation framework, we analyze the functional properties under weak smoothness assumptions. Then, we study existence of measure solutions, blow up and stationary states for the evolution problem.

- In collaboration with Eugene Stepanov (St. Petersburg Inst. of Fine Mechanics and Optics) and Antoine Lemenant (Centro di ricerca matematica Ennio de Giorgi, Pisa): shape optimization problems. In Euclidean context, we study the distance functional from a manifold and other functionals related to partial differential equations and arising in optimal transportation and networks. We search for suitable notions of stationary point and for necessary and sufficient optimality conditions. We try to characterize optimal shapes and their regularity properties. We are particularly interested in the average distance (or irrigation) problem and in the compliance problem

- In collaboration with Luigi Ambrosio (Scuola Normale Superiore, Pisa), Sylvia Serfaty (Laboratoire Jacques-Louis Lions, Universite Pierre et Marie Curie, Paris): the Chapman-Rubinstein-Schatzman mean field model in superconductivity. We study this model in full generality, as an evolution problem on the metric space of real measures, to obtain existence and regularity results. In the framework of gradient flows and Wasserstein structure, which we try to extend to non positive measures, we treat the equation as the evolution of the Ginzburg-Landau energy functional.

Pavia, lì 29/07/2010

Il sottoscritto