

# *Curriculum Vitæ*

**Lorenzo BRANDOLESE**

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**Date of birth:** June, 1<sup>st</sup> 1973, in Milano (Italy)

**Citizenship:** Italian

**Spoken languages:** Italian (native), French (fluent), English (fluent).

**Civil status:** Married

## Positions held, titles and diplomas

### Positions held :

#### **2003–present.**

- *Maitre de conférences* in Mathematics at the University Lyon 1 (tenure).
- Member of the *Institut Camille Jordan* (ICJ) and of team “Partial differential equations and Analysis”.
- Since 2011: vice-director of the ICJ in charge of the scientific animation and the communication.

**2007/08.** Research Scientist at the CNRS.

**2002/03.** Post-doc at *University Paris XII* (France). Member of the “Stability in partial differential equations and fluid mechanics” team.

**2001/02.** Post-doc at *University Paris X*, Nanterre (France). Member of the “Modelization” team.

### Titles and diplomas :

**2011 Qualification for professorship** (General Mathematics and Applied Mathematics) awarded by the french council of universities. Such qualification gives the right to apply to full professor positions in french universities.

**2010 Habilitation** (*Habilitation à diriger des recherches* (Thesis and diploma), University Lyon 1. Dissertation title: *Qualitative properties of solutions to some semilinear parabolic equations*. Defended on December 8th, 2010.

Referees : Eduard Feireisl, Isabelle Gallagher, Yoshikazu Giga

Commettee : Marco Cannone, Isabelle Gallagher, Dragoş Iftimie, Yves Meyer, Jean Claude Saut, Denis Serre.

**2001 Ph.D in mathematics.** Awarded by École Normale Supérieure de Cachan.

Dissertation title: *Localization, oscillations and asymptotic behavior for solutions to the Navier–Stokes equations*

Ph.D advisor : Yves MEYER (ENS Cachan, France).

Dissertation committee : Jean-Yves Chemin (referee), Thierry Gallay, Pierre-Gilles Lemarié, Yves Meyer, Maria Elena Schonbek (referee).

**1998 French Master degree D.E.A.** (diplôme d'études approfondies). Specialization: **Nonlinear applied analysis**, awarded by the University Paris IX–Dauphine (France).

Stage: *Bounded variation functions and applications to Gagliardo-Nirenberg type inequalities*, under the supervision of Albert Cohen.

**1997 Italian Master degree (Laurea)** of mathematics at the University of Milano (Italy).

Final result of 110 points out of 110 *cum laude* “Tesi for the Laurea” dissertation : *Cohen’s conditions, Bernstein filters and wavelets with dilation factor  $p$* , directed by Paolo M. Soardi.

## Grants, contracts and other financial supports

**2010-13** Funding granted by *SENESCYT (Secretaria Nacional de Educacion Superior, Ciencia, Tecnologia e Innovacion)* for the PhD project : “Finite time blowup of slowly oscillating solutions of semilinear parabolic equations”: 120000 \$ (PhD fellowship, awarded to Fernando Cortez) + 7500€.

**2008, 2009** France-Berkeley fund (10 000\$) Co-Principal Investigator of the project “Asymptotic behavior for the quasi-geostrophic system and the Euler equations”, jointly with D. Iftimie (Lyon 1), M. Schonbek (University of California Santa Cruz) and C. Bjorland, University of Texas at Austin.

**2007, 2008** Head of the french team of a bi-national partnership “Hubert Curien EGIDE STAR” (France–Rep. South Korea). The awarded projet was entitled “Behavior of fluid far from obstacles”. The other members of the project were François Vigneron, (Paris XII, France), Hyeong-Ohk Bae, (Ajou University, South Korea), Bum Ja Jin (Mokpo National University, South Korea). Amount of the grant: €15200.

**2006-07** Marie Curie Host Fellowship for the transfer of knowledge: €5800. Project : “Harmonic analysis, Nonlinear analysis and Probability”. This is an individual research contract of two months with Wrocław University, founded by the European Union.

**2006-08 French National Agency for Scientific Research:** €190000. Project : “Singularities and asymptotic behavior for solutions of Euler and Navier–Stokes”. Three-years project involving fourteen researchers from the french University of Rennes, Lyon and Paris. The project dealt with the formation of singularities and the long time behavior in the fluid mechanics. The head of the project was Pr. Christophe Chevry (University of Rennes, FRANCE).

**2005, 2006** Head of the french team for the bi-national project “Polonium”: €11000. This two-years project involved three researchers from Poland, and three from France (University Lyon 1 and Paris-est). The project dealt with self-similarity issues in partial differential equations, with mathematical models for gravitating particles, and with magnetohydrodynamics.

**2005/06:** *Bonus Qualité Recherche*: €2500. Granted by University Lyon 1. In collaboration with Dragoş Iftimie.

**2001/02:** One year grant from the *Università degli studi di Milano* for post-doctoral studies in foreign countries.

**2000/01:** Research contract (six months) with the *Centre de Mathématiques et de leurs applications* at Ecole Normale Supérieure de Cachan.

**1997/98-2000:** Three years financial support granted by the *Istituto Nazionale di Alta Matematica F. Severi*, Roma (Italy) for Ph.D studies in foreign countries.

In addition to the above, I obtained several travel grants ( $\leq$  €1000) from different institutes to attend conferences.

## Visiting positions and foreign collaborators

### Long-term visits (between one and two months):

1. Ajou University and Mokpo National University, Rep. South Korea, September-October 2007 (Invited by Prof. H.-O. Bae and B. J. Jin)
2. University of Wroclaw (Poland), October-November 2006. (Invited by prof. G. Karch).

### Short-term visits (between one and two weeks):

1. Chinese Academy of Mathematica Sciences : September 2012 (invited by Prof. Pigong Han).
2. Zhejiang Normal University, China: April 2010 (invited by Prof. Yong Zhou).
3. University of California Santa Cruz, USA (invited by Prof. M. E. Schonbek). July 2009.
4. University of California Santa Cruz, USA (invited by Prof. M. E. Schonbek). January 2008.
5. University of Wroclaw (Poland) (may 2007) (invited by Prof. P. Biler).

### Hosted researchers, post-docs and Ph.D students (between one week and one month) :

1. Clayton Bjorland (pos-tdoc), University of Texas at Austin SC (april 2008).
2. Piotr Biler, Wroclaw university (two weeks, february 2008. One week, octobre 2005.)
3. Hyeong-Ohk Bae, Ajou University (two weeks, july 2007)
4. Bum Ja Jin, Mokpo National Universtity (two weeks, july 2007)
5. Maria Schonbek, University of California Santa Cruz UCSC (june 2006)

6. Grzegorz Karch, Wroclaw University (Novembre 2005, December 2006 ).
7. Michal Olech (postdoc), Wroclaw University (October 2005).
8. Piotr Biler, Wroclaw University (October 2005).
9. Andrzej Raczynski Wroclaw University (December 2006).

## List of publications (published or accepted)

1. L. Brandolese *Breakdown for the Camassa–Holm Equation Using Decay Criteria and Persistence in Weighted Spaces*, Intern. Mat. Res. Notices **rn218** (2011).
2. L. Brandolese, M. E. Schonbek, *Large time decay and growth for a viscous Boussinesq system* Trans. Amer. Math. Soc. (to appear).
3. C. Bjorland, L. Brandolese, D. Iftimie, M. E. Schonbek,  *$L^p$ -solutions of the steady-state Navier–Stokes equations with rough external forces*, Comm. Part. Diff. Equ, **36**, 216–246, 2011.
4. H.-O. Bae, L. Brandolese, *On the effect of external forces on incompressible fluid motions at large distances*, Ann. Univ. Ferrara (to appear, DOI: 10.1007/s11565-009-0079-z).
5. P. Biler, L. Brandolese *On the parabolic-elliptic limit of the doubly parabolic Keller–Segel system modelling chemotaxis*, Studia Math., **193**, N.3, 241–261 (2009).
6. L. Brandolese *Concentration-Diffusion effects in viscous incompressible flows*, Indiana Univ. Math. J. **58**, N.2, 789–806 (2009).
7. H.-O. Bae, L. Brandolese, B. J. Jin, *Asymptotic behavior for the Navier–Stokes equations with nonzero external forces*, Nonlinear analysis (to appear, doi:10.1016/j.na.2008.10.074).
8. L. Brandolese, *Fine properties of self-similar solutions of the Navier–Stokes equations*, Arch. Rational Mech. Anal. **192**, N.3, 375–401 (2009)
9. L. Brandolese, G. Karch, *Far-field asymptotics of solutions to convection equations with anomalous diffusion*, J. Evol. Equ. **8**, 307–326 (2008).
10. L. Brandolese, F. Vigneron, *New asymptotic profiles of nonstationnary solutions of the Navier–Stokes system*, J. Math. Pures Appl. **88**, 64–86 (2007).
11. L. Brandolese, F. Vigneron, *On the localization of the velocity and the magnetic field in the MHD equations* Proc. Edinburgh Math. Soc. **137 A**, 475–495 (2007).
12. P. Biler, L. Brandolese, *Global existence and finite time blow up for some model of interacting particles* Colloq. Math. **106**, N.2, 293–303 (2006).
13. L. Brandolese, *Application of homogeneous realized Sobolev spaces to Navier-Stokes*, SIAM J. Math. Anal., **37**, N.2, 673–683 (2005).
14. L. Brandolese, *Poisson kernels and sparse wavelet expansions*, Proc. Amer. Math. Soc. **133**, N. 11, 3345–3353 (2005)

15. L. Brandolese, *Weighted- $L^2$  spaces and strong solutions to the Navier-Stokes equations*, Progr. Nonlinear Diff. Eq. Appl. **61**, 27–35 (2005).
16. L. Brandolese, *Space-time decay of Navier-Stokes flows invariant under rotations*, Math. Ann. **329**, 685-706 (2004)
17. L. Brandolese, *Atomic decomposition for the vorticity of a viscous flow in the whole space*, Math. Nachr. **273**, 28-42 (2004)
18. L. Brandolese, *Asymptotic behavior of the energy and pointwise estimates for solutions to the Navier-Stokes equations*, Rev. Mat. Iberoamericana **20**, 223-256 (2004)
19. L. Brandolese, Y. Meyer, *On the instantaneous spreading for the Navier-Stokes system in the whole space*, Contr. Optim. Calc. Var. **8**, pp. 273–285 (2002)
20. L. Brandolese, *Localisation de la vorticit  et applications au comportement asymptotique de Navier-Stokes*, Journ es Equations aux d riv es partielles, Forges-les-eaux, pp. III 1–13 (2002)
21. L. Brandolese, *On the localization of symmetric and asymmetric solutions of the Navier–Stokes equations in  $\mathbb{R}^n$* , C. R. Acad. Sci. Paris, S rie I **t.332**, pp. 125–130 (2001)

## Oral Communications

### Invited talks :

**Septembre 2011** Jinhua (Chine). *International conference on fluid and gas dynamics*

**August 2011**, Loughborough (England). Equadiff 2011.

**Avril 2011** Darmstadt (Allemagne). Darmstadt-Tokio graduate program on fluid dynamics.

**June 2010**, Gargnano (Italy). XXX conference in harmonic analysis.

**January 2010** (scheduled) Campinas (Brazil). Summer School in Fluid mechanics.

**August 2009**, Vancouver (Canada). Workshop on regularity problems in hydrodynamics.

**September 2008**, University Paris XII Val de Marne. Colloquium.

**September 2008**, Bedlewo (Poland), Parabolic and Navier–Stokes equations. *On the far-field behavior of the velocity field*

**May 2008**, Luminy, Vorticity, rotation and symmetry: stabilizing and destabilizing fluid motion. *Concentration-diffusion effects in viscous incompressible flows*

**October 2007** Madrid (Spain), Jornada de An lisis Matem tico en Fluidos, *Fine properties of self-similar solutions of Navier–Stokes*

**September 2007** Suwon (Rep. Korea), Ajou University Colloquium. *Self-similar solutions of Navier–Stokes. Old and new facts.*

**November 2006**, Universit  di Como, Italy. Conference in honnour of P. M. Sordi for his 60th birthday : *A che velocit  si propaga il movimento in un fluido ?*

**September 2006**, Rennes, France. Conference on “Singularités et comportement asymptotique des solutions d’Euler et Navier–Stokes”. *Résultats d’explosion en chimiotactisme*.

**August 2006**, Chambéry, France. Eighth binational Franco-Romanian). “*Global existence versus blow-up for some models of interacting particles*”.

**July 2006**, Lausanne (Switzerland), International conference on the asymptotic behavior in fluid mechanics. “*How fast does the motion propagate through a fluid ?*”

**December 2005**, Marne la Vallée. Conference on functional analysis and applications. “*Anisotropic decay for the Navier–Stokes equations*”.

**September 2005**, Bedlewo (Poland), “Self-similar solutions in nonlinear partial differential equations”. *Localization results in magnetohydrodynamics*.

**March 2004**, Sestri Levante, Italy. Conference of Harmonic Analysis: *Application of Besov spaces to a problem in fluid mechanics*,

**September 2002** St. Petersburg, Russia “NSEQ8: International conference on the Navier–Stokes Equations and applications”: *Asymptotic behavior of the energy and pointwise estimates for solutions to the Navier–Stokes equations*.

**June 2002** Forges les Eaux. Conference “Analysis of partial differential equations”: *Localisation de la vorticit  et application aux comportements asymptotique des solutions de Navier–Stokes*

**March 2002** “Journ e Navier–Stokes” (University Paris XII): *Comportement asymptotique pour les  quations de Navier–Stokes dans  $\mathbb{R}^3$  et dans le demi-espace*.

**Seminars and participation to other conferences.** Lyon (March 2011), “Nonlinear dynamics and modelization” conference. Paris (January 2011), PDE Seminar. Lyon, France (July 2011). Second franco-brazilian summer school on Fluids. Lyon (January 2009), SCASEN conference. Evian (June 2007), Conference “analysis of PDE”, Lausanne (December 2006), conference on new perspective in fluid dynamics. Ecole Normale sup rieure de Lyon (february 2005, seminar). University Lyon 1 (november 2003, seminar). University de Nancy (march 2003, seminar). Conference in the honour of Jean-Michel Bony (Ecole polytechnique, Palaiseau, june 2002). University Paris X, Nanterre (may 2002, seminar). European conference on Harmonic analysis and partial differential equations, (Paris, april 2002) University de Picardie, Amiens (march 2001, seminar) University d’Orl ans, Journ es d’Analyse Fonctionnelle et Harmonique, Colloque des jeunes Chercheurs, (November 2000) Third international congress on Navier–Stokes equations: theory and applications (Varenna, Italy, june 2000) National (italian) congress on harmonic analysis (Aosta, Italy, 1999)

## Teaching experiences

The annual teaching duties of a *Ma tre de conf rences* consist of 128 hours of university lectures, or of 192 hours of exercise sessions or tutorials. In agreement with the needs of the departement, I have chosen to split my teaching duties, since 2003, between lectures (about 25%), exercise sessions (about 50%) and tutorials (about 25%), at both graduate and undergraduate level.

### Graduate and research level:

1. Zhejiang Normal University, People's Rep. China, 2010. Advanced minicourse : “localization properties in fluid mechanics”.
2. Ecole Normale supérieure de Lyon and University Lyon 1 Ph.D course (22 hours): “Les équations des fluides incompressibles”.
3. University of Wrocław, Poland, 2006/07. Ph.D course: “Harmonic analysis tools for some evolution equations”.
4. Ecole Normale supérieure de Lyon and University Lyon 1, France. Exercise sessions for the graduate class “Analysis” and the advanced graduate class “Distributions and partial differential equations”.

### Undergraduate level:

1. At University Lyon 1, France: Topology. Real analysis. Calculus. Functions of several variables. Linear algebra. Complex analysis. (Lectures, Exercise sessions, tutorials)
2. At University Paris XII: Mathematics with Maple. Calculus.
3. At University Paris X: Exercise sessions for undergraduate classes. Mathematical models in Microeconomics. Descriptive statistics. Calculus.

## Student supervision and young co-authors

**2011-present** Ph.D advisor of Fernando Cortez : *Finite time blowup of slowly oscillating solutions of semilinear parabolic equations.*

**2012-present** Supervision of the Master dissertation of Yannick Vincent entitled *Analyse de Littlewood–Paley et applications.*

**2011.** Supervision of 2nd year Master degree dissertation of Pauline Michon and of the 1st year Master degree dissertation of Benjamin Bertrand.

**2007.** Stéphane Hamm, supervision of Master degree dissertation entitled *Non-existence results for the non-linear heat equation.*

**2006.** Mickael Dos-Santos. Supervision of the Master dissertation entitled *Wavelet methods and non-linear approximation.*

**List of young co-authors.** List of co-authors not yet in possession of their Ph.D at the time of our collaboration:

- *François Vigneron*, (now Maître de conférences at University Paris XII)
- *Clayton Bjorland* (now postdoc at University of Texas, Austin).

## National and local responsibilities

### National responsibilities:

1. Member of the French *National Council of University* 2007–2011.

My role consists, among other things, in

- (a) Evaluating and report on applications of new Ph.D, applying for Maître de conférence (assistant professor) positions.
- (b) Evaluating and report on the demands of colleagues who (1) apply for a promotion (2) ask for a reduction of teaching duties on the basis of a research program

2. President of *Baccalauréat* committee, Venissieux (2005).

**Local responsibilities:** The *Institut Camille Jordan* regroups all the mathematicians of the University Lyon 1, the Ecole Centrale de Lyon, the National Institute of applied science of Lyon, and a several scientists of CNRS. It consists of more than 150 permanent faculty and about 70 post-docs and Ph.D students. Inside the Institute I am **member of the directive board**, and I have the following responsibilities:

- (2011–present) **Vice-director** in charge of the **scientific animation** and of the **communication**.

This includes the organization of a monthly colloquium, of welcome meetings and occasional special events; the responsibility of editorial choices (web site, information letters, prospectus); internal and external communication.

- 2004–present. Member of the hiring committee of Mathematics and Applied Mathematics at University Lyon 1.
- 2008–10 Tutor: supervision of first and second year students in Mathematics and Computer Science (interviews, help in their choices, etc.).

### Conference organization:

- Organization of the conference *Mathematical methods in fluid mechanics mathématiques*, in Lyon from January 20th to 22nd 2009.
- Organization of the workshop *Analysis of PDEs*, Lyon, January 2007.
- 2007/08. Co-organization of the weekly seminar *Partial differential equations*, jointly at *Institut Camille Jordan* (Lyon 1) and the Mathematics department of ENS Lyon.

## Miscellanea

### Individual financial awards:

- *Prime de l'excellence scientifique* (Scientific excellence award): 2009–present.
- *Prime de l'encadrement doctorale et de recherche* (Award for research and graduate student supervision), 2005–2008.
- *Prime de responsabilité pédagogique* (Pedagogical responsibilities award), 2008–2010.

### Refereeing activity:

- I wrote referee's reports for the following journals (between parentheses, the name of the editor asking for the reports):  
*Advances in Mathematics* (Charles Fefferman), *Journal of Functional Analysis* (Jean-Michel Coron, Cédric Villani), *Mathematische Annalen* (Yoshikazu Giga), *Archive for Rational Mechanics and Analysis* (Vladimir Šverák), *Annales de l'Institut Henri Poincaré. Analyse non linéaire* (Maria Esteban, Eric Séré), *Communications in Partial Differential Equations* (Panagiotis Souganidis), *Annali della Scuola Normale Superiore di Pisa* (Giuseppe Tomassini), *Mathematische Nachrichten* (Frédéric Klopp), *Journal of Mathematical Analysis and Applications* (Jean-Luc Guermond), *Dynamics of Partial Differential Equations* (Y. Charles Li), *Differential and integral equations* (Yoshikazu Giga), *Journal of Mathematical Fluid Mechanics* (Dongo Chae), *Mathematical Physics, Analysis and Geometry* (A. Boutet de Monvel), *Mathematical Methods in the Applied Sciences* (Xiaoming Wang) *Nonlinear analysis* (Maria Schonbek), *Annali dell'Università di Ferrara* (Reinhard Farwig). *Banach Center Publications* (Piotr Biler)
- Reviewer for the *Mathematical Reviews*.