

Curriculum Vitae - Francesco Fanelli

Basque Center for Applied Mathematics

Alameda de Mazarredo, 14

48009 Bilbao, Bizkaia

Basque Country, SPAIN

Office: y21

Phone: +34.946.567.842

E-mail: ffanelli@bcamath.org

Web page: <http://math.univ-lyon1.fr/homes-www/fanelli/>

Personal information

Date and place of birth: January 24th, 1984 – Chiaravalle (AN) - ITALY

Current position

Basque Center for Applied Mathematics & Ikerbasque - Basque Foundation for Science

Ikerbasque Research Associate Professor

From September 2023

Permanent senior research position.

(On leave from: *Institut Camille Jordan – UMR CNRS 5208* & *Université Claude Bernard Lyon 1*)

Previous positions

Université de Lyon, Université Claude Bernard Lyon 1

Maître de Conférences

September 2015 - August 2023

Assistant Professor position at *Institut Camille Jordan – UMR CNRS 5208*

Scuola Normale Superiore

Post-doctoral research position

October 2014 - August 2015

Junior Visitor at *Centro di Ricerca Matematica “Ennio De Giorgi”*

Institut de Mathématiques de Jussieu-Paris Rive Gauche, Université Paris 7 Diderot

Post-doctoral research position

September 2013 - September 2014

(“Instabilities in Hydrodynamics” project of the *Fondation Sciences Mathématiques de Paris*, head of the project: Christophe Lacave)

Supervisor of the post-doc: ISABELLE GALLAGHER

Basque Center for Applied Mathematics

Post-doctoral research position

September 2012 - August 2013

(ERC Advanced Grant FP7-246775 NUMERIWAVES, head of the project: Prof. Enrique Zuazua)

Supervisor of the post-doc: ENRIQUE ZUAZUA

Université Paris-Est Créteil

Attaché Temp. d’Enseignement et de Recherche

September 2011 - August 2012

(Exercise lecturer for different Bachelor’s degree courses)

Education

Scuola Internazionale Superiore di Studi Avanzati & Université Paris-Est

Doctor Philosophiæ Degree, cotutorial thesis

November 2008 - May 2012

Thesis: *Mathematical analysis of models of non-homogeneous fluids and of hyperbolic equations with low*

regularity coefficients.

Supervisors: FERRUCCIO COLOMBINI, RAPHAËL DANCHIN, ANDREI AGRACHEV

Referees: ISABELLE GALLAGHER, NICOLAS LERNER

Other Committee members: STEFANO BIANCHINI, MARCO CANNONE, GIANNI DAL MASO

Università degli Studi di Trieste

Laurea Magistrale in Matematica October 2006 - October 2008

(Master's Degree in Mathematics)

Mark: *110/110 Cum Laude*

Thesis: *Para-differential calculus and its applications to hyperbolic problems*

Advisor: FERRUCCIO COLOMBINI

Università degli Studi di Pisa

Laurea Triennale in Matematica September 2003 - September 2006

(Bachelor's Degree in Mathematics)

Mark: *110/110 Cum Laude*

Thesis: *The Cauchy-Kovalevska Theorem*

Advisor: FERRUCCIO COLOMBINI

Additional diplomas

Université Claude Bernard Lyon 1

HDR - Habilitation à diriger des recherches 30 May 2023

French habilitation thesis.

Referees: ANNE-LAURE DALIBARD, DAVID LANNES, NADER MASMOUDI

Other Committee members: THOMAS ALAZARD, JEAN-YVES CHEMIN, RAPHAËL DANCHIN,

ISABELLE GALLAGHER, DRAGOȘ IFTIMIE, ANNA LAURA MAZZUCATO, LAURE SAINT-RAYMOND

Ministère de l'Enseignement Supérieur et de la Recherche (FRANCE)

Qualification – Maître de Conférences Campagne 2013

Sections 25 (Mathématiques) and 26 (Mathématiques appliquées et applications des mathématiques)

Scuola Internazionale Superiore di Studi Avanzati

Diploma Percorso Formativo Comune October 2008

(Diploma in Mathematics awarded by SISSA for Master's degree student; on a merit base)

Fellowships and awards

ERC Consolidator Grant 2024

Finalist (passed to step 2: interview)

Ministère de l'Enseignement Supérieur et de la Recherche (FRANCE)

Teaching and research excellence fellowship January 2017 - August 2023

“Prime d'encadrement doctoral et de recherche – PEDR”.

For the periods 01/2017 - 12/2020, 01/2021 - 12/2024.

Université Claude Bernard Lyon 1

Congé pour Recherche ou Conversion Thématique February 2022 - July 2022

50% reduction of teaching duties (for research purposes)

CNRS – Centre National de la Recherche Scientifique

Délégation CNRS February 2019 - July 2019

50% reduction of teaching duties (for research purposes)

Mathematisches Forschungsinstitut Oberwolfach

Visiting fellowship
 “Oberwolfach Leibniz fellowship”

June 2017

CRM “De Giorgi”, Scuola Normale Superiore

Post-doctoral fellowship
 “CRM Junior Visiting Program”

October 2014 - September 2016

IMJ-PRG – UMR 7586, Université Paris-Diderot

Post-doctoral fellowship
 “Instabilities in Hydrodynamics” project of the *Fondation Sciences Mathématiques de Paris*

September 2013 - August 2014

BCAM – Basque Center for Applied Mathematics

Post-doctoral fellowship
 ERC Advanced Grant “NUMERIWAVES”, Principal Investigator Prof. Enrique Zuazua

September 2012 - August 2013

Università Italo Francese/Université Franco Italienne

“Vinci 2010” fellowship for cotutorial thesis

November 2010

SISSA - Scuola Internazionale Superiore di Studi Avanzati

Ph.D. fellowship

November 2008 - October 2011

SISSA - Scuola Internazionale Superiore di Studi Avanzati

“Percorso Formativo Comune” fellowship

October 2006 - September 2008

INdAM – Istituto Nazionale di Alta Matematica

Bachelor’s degree fellowship

October 2003 - September 2006

Academic responsibilities

PRESENT ADMINISTRATIVE AND SCIENTIFIC TASKS

- ▷ Member of the Scientific Committee, responsible of the Analysis and PDEs part of the programme “BCAM Severo Ochoa Courses” – Since April 2024
 Courses offered to advanced undergraduate and graduate students from Bilbao area; largely open (through streaming and offered fellowships) also to external students
- ▷ Member of the evaluation committee for the “Prix de l’Université du Conseil départemental du Val de Marne” – Since February 2019
 Annual prize awarded to the best students (Master or Ph.D.) for their research works

PAST TASKS

- ▷ Member of the Governing Board of the *Institut Henri Poincaré* – October 2020 - August 2023
- ▷ Evaluator for the *National Science Center Poland* – September 2022
 “OPUS-23” funding scheme
- ▷ “Réfèrent pédagogique” (pedagogical contact person) for Bachelor’s students – Sept. 2020 - August 2022
- ▷ Evaluator for the *FONDECYT* – July 2018
 “Initiation into Research” programme, *CONICYT – Chilean National Science and Technology Commission*
- ▷ Member of hiring committees

1. for MC (assistant professor) positions:
 2017 at ICJ, 2020 at ICJ, 2023 at ÉNS Lyon

2. for Associate Professor positions:

2021 at Pontificia Universidad Católica de Chile

- ▷ ICJ personnel delegate – March 2016 - August 2023
- ▷ Co-responsible of the web page of the team ÉDP-Analyse at ICJ – March 2016 - August 2023

Projects and grants

ONGOING PROJECTS

“Effets d’un transport irrégulier en mécanique des fluides”

CNRS – Centre National de la Recherche Scientifique

PROJECT COORDINATOR (with L. BRANDOLESE)

October 2022 - September 2025

Program “Contrats doctoraux à l’international”. Financial support for a 3-years Ph.D. thesis. In collaboration with the CNRS IRL CMM – “Center for Mathematical Modeling” (Santiago, Chile).

CRISIS - “Critical Regularity, Interfaces, Scale Interactions and Singularities in the dynamics of non-homogeneous fluids”

ANR – Agence Nationale de la Recherche

PROJECT COORDINATOR

February 2021 - January 2025

Program “ANR JCJC 2020”. Budget: 167.875,20 euros.

Extended till December 2025.

PAST PROJECTS

HiCE - “High Concentration Effects in non-linear models of fluid mechanics”

UCBL – Université Claude Bernard Lyon 1

PROJECT COORDINATOR

2022 - 2024

Program “SENS 2022”. Budget: 100.000 euros (equivalent to a two-years post-doctoral contract).

“SingFlows – Singular flows: boundary layers, vortex filaments, wave-structure interaction”

ANR – Agence Nationale de la Recherche

Member of the project

2018 - 2022

Principal investigator: DAVID GÉRARD-VARET.

BORDS – “Boundaries, oscillations, layers in differential systems”

ANR – Agence Nationale de la Recherche

Member of the project

January 2017 - June 2022

Principal investigator: CHRISTOPHE PRANGE.

Turb1D - “Reduced models of turbulence”

CNRS – Centre National de la Recherche Scientifique

PROJECT COORDINATOR

February 2020 - December 2021

Program “International Emerging Actions 2019”. Co-PI: RAFAEL GRANERO-BELINCHÓN. Budget: 3000 euros (for the first year) + 3000 euros (for the second year).

CRISIS - “Critical Regularity, Interfaces, Scale Interactions and Singularities in the dynamics of non-homogeneous fluids”

LabEx MILyon

PROJECT COORDINATOR

February 2020 - January 2021

Program “Projets émergents 2020”. Budget: 10.000 euros.

ODyNHoF II - “On the dynamics of non-homogeneous fluids: perturbations and asymptotics”

CNRS – Centre National de la Recherche Scientifique

PROJECT COORDINATOR March 2018 - December 2018
Small one-year project within the program “PEPS jeunes chercheur-e-s 2018”. Budget: 2000 euros.

ODyNHoF - “On the dynamics of non-homogeneous fluids: well-posedness and singular limits”

CNRS – Centre National de la Recherche Scientifique

PROJECT COORDINATOR March 2017 - December 2017
Small one-year project within the program “PEPS jeunes chercheur-e-s 2017”. Budget: 2500 euros.

“Quelques problèmes mathématiques issus de la Mécanique des Fluides non-visqueux”

Université Claude Bernard - Lyon 1

PROJECT COORDINATOR June 2016 - December 2016
Bonus Qualité Recherche – Accueil Enseignants-Chercheurs 2016. Budget: 6700 euros.

DySCoMETAL - “Dynamics of some compressible models: existence theory and asymptotic limits”

Fédération de Recherche en Mathématiques Rhône-Alpes-Auvergne

PROJECT COORDINATOR February 2016 - December 2016
Small projects to support collaborations between researchers from various Departments in Rhône-Alpes-Auvergne region. Budget: 1000 euros.

“Instabilities in Hydrodynamics”

Fondation Sciences Mathématiques de Paris

Member of the project September 2013 - September 2014
Principal investigator: CHRISTOPHE LACAVER.

“NUMERIWAVES” – ERC Advanced Grant FP7-246775

European Research Council

Member of the project September 2012 - August 2013
Principal investigator: ENRIQUE ZUAZUA.

Grants for invitations

- 2020** UCBL Visiting Professor position
Invitation of E. FEIREISL (Academy of Sciences of the Czech Republic) – one month
- 2019** MILyon grant (2800 €)
Invitation of R. GRANERO BELINCHÓN (Universidad de Cantabria, Spain) – one month

Organization of scientific events

- 2024** • *Trends and perspectives in the analysis of PDEs* (<https://sites.google.com/view/trendspdes/home?pli=1>)
INdAM Workshop – 16-20 September, Roma (Italy)
- *Meeting On Differential Equations in Ancona* (MODE in Ancona)
(<https://sites.google.com/view/mode-in-ancona/home>)
Workshop – 02-04 September, Ancona (Italy)
- *Recent trends in the analysis and control of fluids*
Minisymposium at the conference CEDYA 2024 – 24-28 June, Bilbao (Spain)
- *Bilbao-Bordeaux workshop on PDEs*
Workshop – 08-09 April, Bilbao (Spain)
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- 2023** • *More Anomalies In PDEs* (MAIn PDEs)
Conference – 17-21 September, Bertinoro (Italy)

- *Aspects locaux et non-locaux en mécanique des fluides* (<https://indico.math.cnrs.fr/e/alone>)
Workshop – 15-17 March, Lyon (France)
- 2022 - 2023** • Organiser of the working group “*GéoMaths*” between ICJ and LGL (resp. Maths and Geology institutes)
Once per month, one talk per meeting – Lyon (France)
- Co-organiser of “*MathsInFluids*” (<https://www-fourier.univ-grenoble-alpes.fr/lacavec/MathsInFluids/>)
Working group: one-day meetings, once per month – Lyon (France)
- 2022** • *Summer school on fluids and turbulence* (<https://mathsfluid2022.sciencesconf.org/>)
Conference – From 27 June to 01 July, Lyon (France)
- *TURBIN – Turbulence and Intermittency* (<https://turbin.sciencesconf.org/>)
A one-day workshop – 28 February, Lyon (France)
- 2020 - 2022** Co-organiser of the *Journée “Jeunes Lyonnais en Analyse et Modélisation”*
A one-day workshop, twice per year – Lyon (France)
- 2016 - 2022** Co-organiser of the “*Séminaire EDP-Analyse*”
Seminar of the team ÉDP-Analyse at Institut Camille Jordan
- 2021** • *Journées ÉDP Auvergne-Rhône-Alpes*
Workshop – 18-19 November, Saint-Étienne (France)
- *Turb1d 2021*
A two-days workshop – 2-3 November, Santander (Spain)
- *CRISIS kick-off workshop*
Web conference – 19-25-26-31 March, 01-02 April
- 2020** *Turb1d 2020*
Web conference – 23-27 November
- 2017** *From students to mathematicians: an excellence master program in Trieste*
Conference, organising and scientific committees member – 14-16 June, Trieste (Italy)

Supervision activity

POST-DOCS

- 2024 - now** *Pedro Gabriel Fernández Dalgo* – Basque Center for Applied Mathematics (Spain)
Post-doc (funded by BCAM)
- 2023 - now** *María Eugenia Martínez Martini* – Université Claude Bernard Lyon 1 (France)
Post-doc (project HiCE, funded by the program SENS 2022 of the UCBL)
- 2021 - 2022** *Marco Bravin* – Université Claude Bernard Lyon 1 (France)
Post-doc (funded by the ANR project CRISIS)

PH.D. STUDENTS

- 2022 - now** *Mathieu Pageard* – Université Claude Bernard Lyon 1 (France)
Ph.D. thesis – co-advised with L. BRANDOLESE
“Effets d’un transport irrégulier en mécanique des fluides”
Funded by **CNRS** via the program “Contrats doctoraux à l’international”
- 2019 - 2022** *Dimitri Cobb* – Université Claude Bernard Lyon 1 (France)
Ph.D. thesis
“Mathematical analysis of models of fluids in interaction with a magnetic field”

2018 - 2022 *Gabriele Sbaiz* – Università degli Studi di Trieste (Italy) & Université Claude Bernard Lyon 1 (France)
Cotutorial Ph.D. thesis – co-advised with D. DEL SANTO
“Some stability and instability issues in the dynamics of highly rotating fluids”
Supported by **Università Italo Francese/Université Franco Italienne** via the “Vinci 2020” fellowship

UNDERGRADUATE STUDENTS

2024 *Yanis Cousino* – École Normale Supérieure de Lyon (France)

First year Master thesis

“Mathematical analysis of reduced models for turbulent flows”

2023 *Nhan-Trung Tran* – Université Claude Bernard Lyon 1 (France)

Second year Master thesis

“Autour des équations d’Euler incompressibles”

2022 *Ophélie Cuvillier* – Université Paris-Saclay, Orsay (France)

Second year Master thesis

“Étude mathématique d’un modèle de turbulence à deux équations”

2019 *Dimitri Cobb* – École Normale Supérieure de Lyon (France)

Second year Master thesis

“On the fast rotation asymptotics of a non-homogeneous magnetohydrodynamic system”

2018 *Florent Novembre* – École Normale Supérieure de Lyon (France)

First year Master thesis

“Autour d’un couplage hyperbolique-elliptique décrivant la dynamique des bulles”

2017-2018 *Jan Bartsch* – Universität Würzburg (Germany)

Second year Master thesis – co-advised with A. BORZÌ and S. ROY

“Optimal control problems governed by Liouville models - Theoretical analysis and implementation”

Participation in Ph.D. committees

2024 **Referee** and committee member for the Ph.D. thesis of *Florent Noisette*

Bordeaux (France), 10/12/2024

2021 **Referee** and committee member for the Ph.D. thesis of *Jan Bartsch*

Würzburg (Germany), 08/11/2021

Publications

1. “Ekman boundary layers in a domain with topography”
(with Jean-Yves Chemin, Isabelle Gallagher)
Submitted (2024)
2. “Global existence for non-homogeneous incompressible inviscid fluids in presence of Ekman pumping”
(with Marco Bravin)
Submitted (2024)
3. “Well-posedness results for hyperbolic operators with coefficients rapidly oscillating in time”
(with Ferruccio Colombini, Daniele Del Santo)
Annali della Scuola Normale Superiore Classe di Scienze, accepted for publication (2023)

4. “Well-posedness and singularity formation for the Kolmogorov two-equation model of turbulence in 1-D”
(with Rafael Granero-Belinchón)
Journal of Dynamics and Differential Equations, accepted for publication (2023)
5. “Effective velocity and L^∞ -based well-posedness for incompressible fluids with odd viscosity”
(with Alexis F. Vasseur)
SIAM Journal on Mathematical Analysis, 57 (2025), n. 1, p. 153-189
6. “Thermally driven fluid convection in the incompressible limit regime”
(with Eduard Feireisl)
Pures and Applied Analysis, 6 (2024), n. 3, p. 835-858
7. “Well-posedness theory for non-homogeneous incompressible fluids with odd viscosity”
(with Rafael Granero-Belinchón, Stefano Scrobogna)
Journal de Mathématiques Pures et Appliquées (9), 187 (2024), p. 58-137
8. “Well-posedness of the Kolmogorov two-equation model of turbulence in optimal Sobolev spaces”
(with Ophélie Cuvillier, Elena Salguero)
Journal of Evolution Equations, 23 (2023), n. 4, Paper n. 68
9. “Fast rotating non-homogeneous fluids in thin domains and the Ekman pumping effect”
(with Marco Bravin)
Journal of Mathematical Fluid Mechanics, 25 (2023), n. 4, Paper n. 83
10. “Low Mach number limit for degenerate Navier-Stokes equations in presence of strong stratification”
(with Ewelina Zatorska)
Communications in Mathematical Physics, 400 (2023), p. 1463-1506
11. “Elsässer formulation of the ideal MHD and improved lifespan in two space dimensions”
(with Dimitri Cobb)
Journal de Mathématiques Pures et Appliquées (9), 169 (2023), p. 189-236
12. “Finite time blow-up for some parabolic systems arising in turbulence theory”
(with Rafael Granero-Belinchón)
Zeitschrift für Angewandte Mathematik und Physik, 73(5) (2022), Paper n. 180
13. “Anisotropy and stratification effects in the dynamics of fast rotating compressible fluids”
(with Edoardo Bocchi, Christophe Prange)
Annales de l’Institut Henri Poincaré (C) Analyse Non Linéaire, 39(3) (2022), p. 647-704
14. “Incompressible and fast rotation limit for barotropic Navier-Stokes equations at large Mach numbers”
Physica D, 428 (2021), Paper n. 133049
15. “A numerical investigation of Brockett’s ensemble optimal control problems”
(with Jan Bartsch, Alfio Borzì, Souvik Roy)
Numerische Mathematik, 149(1) (2021), p. 1-42
16. “Ergodic theory for energetically open compressible fluid flows”
(with Eduard Feireisl, Martina Hofmanová)
Physica D, 423 (2021), Paper n. 132914
17. “On the fast rotation asymptotics of a non-homogeneous incompressible MHD system”
(with Dimitri Cobb)
Nonlinearity, 34(4) (2021), p. 2483-2526
18. “A multi-scale problem for viscous heat-conducting fluids in fast rotation”
(with Daniele Del Santo, Gabriele Sbaiz, Aneta Wróblewska-Kamińska)
Journal of Nonlinear Science, 31(1) (2021), Paper n. 21

19. “Some remarks on steady solutions to the Euler system in \mathbb{R}^d ”
(with Eduard Feireisl)
Applied Mathematics Letters, 116 (2021), Paper n. 107031
20. “Rigorous derivation and well-posedness of a quasi-homogeneous ideal MHD system”
(with Dimitri Cobb)
Nonlinear Analysis: Real World Applications, 60 (2021), Paper n. 103284
21. “Statistical solutions to the barotropic Navier-Stokes system”
(with Eduard Feireisl)
Journal of Statistical Physics, 181(1) (2020), p. 212-245.
22. “On the Cauchy problem for microlocally symmetrizable hyperbolic systems with log-Lipschitz coefficients”
(with Ferruccio Colombini, Daniele Del Santo, Guy Métivier)
Indiana University Mathematics Journal, 69(3) (2020), p. 785-836
23. “A well-posedness result for viscous compressible fluids with only bounded density”
(with Raphaël Danchin, Marius Paicu)
Analysis & PDE, 13(1) (2020), p. 275-316
24. “Asymptotics of fast rotating density-dependent incompressible fluids in two space dimensions”
(with Isabelle Gallagher)
Revista Matemática Iberoamericana, 35(6) (2019), p. 1763-1807
25. “A theoretical investigation of Brockett’s ensemble optimal control problems”
(with Jan Bartsch, Alfio Borzì, Souvik Roy)
Calculus of Variations and Partial Differential Equations, 58(5) (2019), Paper n. 162
26. “Corrigendum to “Highly rotating viscous compressible fluids in presence of capillarity effects” ”
Mathematische Annalen, 370(3-4) (2018), p. 1789-1797
27. “Global well-posedness and long-time dynamics for a higher order Quasi-Geostrophic type equation”
(with Francesco De Anna)
Journal of Functional Analysis, 274(8) (2018), p. 2291-2355
28. “Some local questions for hyperbolic systems with non-regular time dependent coefficients”
Journal of Hyperbolic Differential Equations, 14(2) (2017), p. 301-322
29. “A singular limit problem for rotating capillary fluids with variable rotation axis”
Journal of Mathematical Fluid Mechanics, 18(4) (2016), p. 625-658
30. “Highly rotating viscous compressible fluids in presence of capillarity effects”
Mathematische Annalen, 366(3-4) (2016), p. 981-1033
31. “The well-posedness issue in Sobolev spaces for hyperbolic systems with Zygmund-type coefficients”
(with Ferruccio Colombini, Daniele Del Santo, Guy Métivier)
Communications in Partial Differential Equations, 40(11) (2015), p. 2082-2121
32. “Analysis of an inviscid zero-Mach number system in endpoint Besov spaces for finite-energy initial data”
(with Xian Liao)
Journal of Differential Equations, 259(10) (2015), p. 5074-5114
33. “The well-posedness issue for an inviscid zero-Mach number system in general Besov spaces”
(with Xian Liao)
Asymptotic Analysis, 93(1-2) (2015), p. 115-140
34. “Weak observability estimates for 1-D wave equations with rough coefficients”
(with Enrique Zuazua)
Annales de l’Institut Henri Poincaré (C) Analyse Non Linéaire, 32(2) (2015), p. 245-277

35. “A well-posedness result for hyperbolic operators with Zygmund coefficients”
(with Ferruccio Colombini, Daniele Del Santo, Guy Métivier)
Journal de Mathématiques Pures et Appliquées (9), 100(4) (2013), p. 455-475
36. “Time dependent loss of derivatives for hyperbolic operators with non-regular coefficients”
(with Ferruccio Colombini, Daniele Del Santo, Guy Métivier)
Communications in Partial Differential Equations, 38(10) (2013), p. 1791-1817
37. “Conservation of geometric structures for non-homogeneous inviscid incompressible fluids”
Communications in Partial Differential Equations, 37(9) (2012), p. 1553-1595
38. “The well-posedness issue for the density-dependent Euler equations in endpoint Besov spaces”
(with Raphaël Danchin)
Journal de Mathématiques Pures et Appliquées (9), 96(3) (2011), p. 253-278
39. “A note on non-homogeneous hyperbolic operators with low regularity coefficients”
(with Ferruccio Colombini)
Rendiconti dell’Istituto di Matematica dell’Università di Trieste, vol. 42 suppl. (2010), p. 1-25

Proceedings of conferences and seminars

1. “Geophysical flows and the effects of a strong surface tension”
Submitted (2016)
2. “On the influence of gravity in the dynamics of geophysical flows”
(with Daniele Del Santo, Gabriele Sbaiz, Aneta Wróblewska-Kamińska)
Mathematics in Engineering, 5(1) (2023), Paper n. 008
3. “Symmetry breaking in ideal magnetohydrodynamics: the role of the velocity”
(with Dimitri Cobb)
Journal of Elliptic and Parabolic Equations, 7(2) (2021), p. 273-295
4. “No loss of derivatives for hyperbolic operators with Zygmund-continuous coefficients in time”
(with Ferruccio Colombini, Daniele Del Santo)
“Anomalies in Partial Differential Equations”, Springer-INdAM Series, Springer (2021), p. 127-148
5. “A few remarks on hyperbolic systems with Zygmund in time coefficients”
“Shocks, singularities and oscillations in Nonlinear Optics and Fluid Mechanics”, Springer-INdAM series, Springer (2017), p. 75-102
6. “A note on viscous capillary fluids in fast rotation”
Bruno Pini Mathematical Analysis Seminar, Univ. Bologna (2015), p. 86-102
7. “A note on complete hyperbolic operators with log-Zygmund coefficients”
(with Ferruccio Colombini, Daniele Del Santo, Guy Métivier)
“Fourier Analysis”, Trends Math., Birkhäuser/Springer (2014), p. 47-72

Presentations at conferences and workshops

- 2025** • *Cabo de Gata PDE days*
Workshop – San José (Spain)
TBA
- *Spectral Theory, Fourier Analysis and PDE II*
Spring school & workshop – Bilbao (Spain)
TBA

- *EDP e Dintorni X: Tenth meeting around PDE*
Workshop – Bari (Italy)
“Hyperbolic effects in incompressible fluid mechanics”
 - *Fluids@PoliMi*
Workshop – Milano (Italy)
“Geometric constraints in fast rotating fluids”
- 2024**
- *International Conference on Analysis of PDEs in Fluid Mechanics*
Conference – Nanjing (China)
“Odd fluids”
 - *Mathematics of fluids in motion: recent results and trends*
CIRM Conference – Marseille (France)
“Ekman layers in presence of topography”
 - *PDEs in Tenerife: from theory to applications*
Workshop – Tenerife (Spain)
“Asymptotics of fast rotating fluids and Ekman boundary layers”
 - *AMAED Fest’24*
Workshop – Santander (Spain)
“On the incompressible Euler equations with variable density” (two-hours mini-course)
(Part 1: <https://www.youtube.com/watch?v=SNJMK-nCkh0>)
 - *Bienal de la Real Sociedad Matemática Española*
Special session “New Trends and Perspectives in Fluid Dynamics”
Pamplona (Spain)
“Rigorous derivation of reduced models for ocean dynamics”
- 2023**
- *AMAED Fest’23*
Workshop – Santander (Spain)
“Hyperbolic effects in incompressible fluid mechanics”
 - *Workshop on Analysis of PDEs*
Workshop – Karlsruhe (Germany)
“Hyperbolic effects in incompressible fluid mechanics”
- 2022**
- *MathFlows 2022*
CIRM Conference – Marseille (France)
“Odd fluids” (<https://library.cirm-math.fr/Record.htm?idlist=1&record=19280753124910089359>)
 - *Against the flow*
Conference – Będlewo (Poland)
“Well and ill-posedness issues for some models of turbulence”
 - *VIII conferencia de matemáticos ecuatorianos en París*
IHP Conference – Paris (France)
“Well and ill-posedness issues for some models of turbulence”
 - *Fluid-dynamics day in Trieste*
One-day workshop – Trieste (Italy)
“Well- and ill-posedness issues for some turbulence model”
- 2021**
- *Mécanique des fluides: étude qualitative et comportement asymptotique des solutions*
Conference – Peyresq (France)
“Statistical solutions to the barotropic Navier-Stokes equations”

- *Analyse harmonique et ÉDP*
Workshop – Évry (France)
“On some non-homogeneous perturbations of the incompressible Euler equations”
- *SIAM Conference on Mathematical Aspects of Materials Science*, Minisymposium “Recent analytical and numerical developments on Fluid and Solid Mechanics: inhomogeneous fluids, geophysical phenomena, complex fluids and materials” (online)
Conference – Bilbao (Spain)
“Some mathematical aspects of geophysical fluid dynamics”
- 2020** • *Vorticity, rotation and symmetry (V): global results and nonlocal phenomena*
CIRM Conference – Marseille (France)
“On some non-homogeneous perturbations of the incompressible Euler equations”
- *MathFlows 2020*
Conference – Będlewo (Poland)
“Well-posedness for viscous compressible fluids with only bounded density”
- 2019** • *New trends in propagation of linear and nonlinear wave phenomena*
Conference – Erice (Italy)
“Multiscale analysis of viscous fast rotating fluids”
- 2018** • *12th AIMS conference on Dynamical Systems, Differential Equations and Applications*, Special Sessions
“Recent trends and progress in mathematical fluid dynamics” & “Nonlinear and nonlocal evolution PDEs”
Conference – Taipei (Taiwan)
“Density-dependent incompressible fluids in fast rotation”
“Well-posedness for viscous compressible fluids with only bounded density”
- *Asymptotic analysis of dispersive partial differential equations*
Conference – Firenze (Italy)
“Well-posedness for viscous compressible fluids with only bounded density”
- *Ninth itinerant meeting in PDEs*
Workshop – Bordeaux (France)
“Asymptotic dynamics of non-homogenous fluids in fast rotation”
- 2017** • *Simposio di Analisi Matematica*
Workshop (in honour of Ferruccio Colombini) – Pisa (Italy)
“Asymptotic behaviour of non-homogenous fluids in fast rotation”
- *MathFlows 2017*
Conference – Będlewo (Poland)
“Fast rotating capillary fluids: dispersion, symmetrization and perturbation”
- 2016** • *XIII Colloque Franco-Roumain de Mathématiques appliquées*
Conference – Iași (Romania)
“On some models of non-homogeneous inviscid fluids”
- 2015** • *Journées ÉDP Rhône-Alpes-Auvergne 2015*
Conference – Clermont-Ferrand (France)
“Perte de régularité dans des problèmes hyperboliques”
- *Shocks, singularities and oscillations in Nonlinear Optics and Fluid Mechanics*
Conference (in honour of Guy Métivier) – Roma (Italy)
“Loss of regularity in hyperbolic Cauchy problems”
- *AMS-EMS-SPM 2015 International Meeting*, Special Session “PDEs: ambitious mathematics for real-life applications”

Conference – Porto (Portugal)

“A singular limit problem for viscous compressible fluids in presence of capillarity”

2014 • *Colloque international 2014 du GDRI LEM2I*

CIRM Conference – Marseille (France)

“On the Cauchy problem for hyperbolic operators with non-Lipschitz coefficients”

• *Asymptotic analysis of dispersive PDEs*

Conference – Pienza (Italy)

“A singular limit problem for viscous compressible fluids in presence of capillarity”

• *PDEs: Analysis, Control, Numerics and Applications*

Workshop – Bilbao (Spain)

“A singular limit problem for viscous compressible fluids in presence of capillarity”

• *Journée Jeunes Contrôleurs 2014*

Workshop – Paris (France)

“Wave operators with non-Lipschitz coefficients: energy and observability estimates”

2013 • *Linear and Nonlinear Hyperbolic Equations*

CRM De Giorgi conference – Pisa (Italy)

“Observability estimates for 1-D wave equations with non-Lipschitz coefficients”

• *TAMTAM XIII* (PLENARY SPEAKER)

Conference – Algiers (Algeria)

“Wave operators with non-Lipschitz coefficients: energy and observability estimates”

• *Journées DYNAMO 2013*

Conference – Orléans (France)

“Some models of non-homogeneous inviscid fluids”

• *Proprietà geometriche microlocali delle equazioni differenziali alle derivate parziali*

Workshop – Cesena (Italy)

“Some models of non-homogeneous inviscid fluids”

2012 • *Instabilities in Hydrodynamics*

IHP Conference – Paris (France)

“Persistence of geometric structures for inviscid incompressible fluids”

• *Fourier Analysis and Pseudo-Differential Operators*

Conference – Helsinki (Finland)

“On the well-posedness for hyperbolic operators with Zygmund coefficients”

• *Modern Aspects of Phase Space Analysis*

Conference – Freiberg (Germany)

“Persistence of geometric structures for the incompressible Euler system”

2009 • *Geometric Flows and Geometric Operators*

CRM De Giorgi trimester – Pisa (Italy)

“Paradifferential calculus and its applications to hyperbolic problems”

Delivered seminars

2025 • *IMB, Université de Bordeaux*

Bordeaux (France)

TBA

- *Hong Kong Polytechnic University* (two on-line talks)
Hong Kong (China)
“Recent trends in the analysis of fast rotating fluids”
& “Emergence of Ekman boundary layers for fluids in fast rotation”
- 2024** • *LMAP, Université de Pau et des Pays de l’Adour*
Pau (France)
“Analyse mathématique de quelques modèles de turbulence”
- *Basque Center for Applied Mathematics & Universidad del País Vasco/Euskal Herriko Unibersitatea*
& Bilbao–Bordeaux–Toulouse online seminar
Bilbao (Spain)
“Transport structures in incompressible fluid mechanics”
- 2023** • *Universidad de Granada*
Granada (Spain)
“Hyperbolic effects in incompressible fluid mechanics”
- *LAMA, Université Savoie Mont Blanc*
Chambéry (France)
“Hyperbolicité en mécanique des fluides incompressibles”
- *LMBP, Université Clermont Auvergne*
Clermont-Ferrand (France)
“Hyperbolicité en mécanique des fluides incompressibles”
- 2022** • *ICJ, Université Claude Bernard - Lyon 1*
Lyon (France)
“Hyperbolicité en mécanique des fluides incompressibles”
- *Institute of Mathematics of the Polish Academy of Sciences*
Warsaw (Poland)
“Singular perturbation problems arising in geophysical fluid dynamics”
- *Karlsruhe Institute of Technology*
Karlsruhe (Germany)
“Well and ill-posedness issues for some models of turbulence”
- 2021** • *ICJ, Université Claude Bernard - Lyon 1*
Lyon (France)
“Perturbations non-homogènes des équations d’Euler incompressibles”
- *LaMME, Université d’Évry*
Évry (France)
“Analyse asymptotique de flots géophysiques”
- *Karlsruhe Institute of Technology*
Karlsruhe (Germany)
“Viscous compressible fluids with discontinuous densities”
- *Academy of Sciences of the Czech Republic & Nečas Center for Mathematical Modeling* (online)
Prague (Czech Republic)
“Statistical solutions to the barotropic Navier-Stokes equations”
- *Universität Würzburg* (online)
Würzburg (Germany)
“Viscous compressible fluids with discontinuous densities: old and new”

- *Imperial College London* (online)
London (United Kingdom)
“Statistical solutions to the barotropic Navier-Stokes equations”
- *LMR, Université de Reims Champagne-Ardenne* (online)
Reims (France)
“Perturbations non-homogènes des équations d’Euler incompressibles”
- 2020** • *CEREMADE, Université Paris-Dauphine*
Paris (France)
“Dynamique asymptotique de fluides inhomogènes en rotation rapide”
- 2019** • *ICJ, Université Claude Bernard - Lyon 1*
Lyon (France)
“Caractère bien posé pour des fluides compressibles avec une densité bornée”
- *Center for Mathematical Modeling, Universidad de Chile*
Santiago (Chile)
“Well-posedness for viscous compressible fluids with only bounded density”
- 2018** • *Cardiff University*
Cardiff (United Kingdom)
“Asymptotic dynamics of non-homogenous fluids in fast rotation”
- *Département de Mathématiques d’Orsay, Université Paris Sud*
Orsay (France)
“Dynamique asymptotique de fluides inhomogènes en rotation rapide”
- *LAGA, Université Paris 13*
Villetaneuse (France)
“Fluides capillaires en rotation rapide: dispersion, symétrisation et perturbation”
- *Università di Pisa*
Pisa (Italy)
“Loss of regularity in hyperbolic Cauchy problems”
- 2017** • *Institut Fourier, Université Grenoble Alpes*
Grenoble (France)
“Limites singulières de fluides inhomogènes en rotation rapide”
- *IRMAR, Université Rennes 1*
Rennes (France)
“Limites singulières de fluides inhomogènes en rotation rapide”
- *Universität Würzburg*
Würzburg (Germany)
“Loss of regularity in hyperbolic Cauchy problems”
- *Karlsruhe Institute of Technology*
Karlsruhe (Germany)
“Loss of regularity in hyperbolic Cauchy problems”
- *Mathematical Institute, Universität Bonn*
Bonn (Germany)
“Asymptotic behaviour of non-homogenous fluids in fast rotation”
- *Laboratoire de Mathématiques AGM, Université de Cergy-Pontoise*
Cergy-Pontoise (France)
“Des questions de régularité dans les problèmes hyperboliques”

- 2016** • *Séminaire franco-tunisien d'équations aux dérivées partielles*
Tunis (Tunisia)
"Des questions de régularité dans les problèmes hyperboliques"
- *LaMME, Université d'Évry-Val-d'Essonne*
Évry (France)
"Perte de regularité dans des problèmes hyperboliques"
- 2015** • *ICJ, Université Claude Bernard - Lyon 1*
Lyon (France)
"Fluides visqueux capillaires en rotation rapide"
- *Università di Bologna – "Bruno Pini" Mathematical Analysis Seminar*
Bologna (Italy)
"Viscous capillary fluids in fast rotation"
 - *Basque Center for Applied Mathematics*
Bilbao (Spain)
"Viscous capillary fluids in fast rotation"
 - *IMB, Université de Bordeaux*
Bordeaux (France)
"Viscous capillary fluids in fast rotation"
- 2014** • *LAMA, Université de Savoie*
Chambéry (France)
"A singular limit problem for viscous compressible fluids in presence of capillarity"
- *Institute of Mathematics of the Polish Academy of Sciences*
Warsaw (Poland)
"A singular limit problem for viscous compressible fluids in presence of capillarity"
 - *IRMAR, Université de Rennes 1*
Rennes (France)
"Propagation des ondes dans des milieux fortement non-homogènes: caractère bien posé et contrôle"
 - *Conservatoire National des Arts et Métiers*
Paris (France)
"Opérateurs des ondes à coefficients non-Lipschitz: estimations d'énergie et d'observabilité"
- 2013** • *Università degli Studi di Trieste*
Trieste (Italy)
"Wave operators with non-Lipschitz coefficients: energy and observability estimates"
- *Mathematical Institute of the Academy of Sciences of the Czech Republic*
Prague (Czech Republic)
"Some models of non-homogeneous inviscid fluids"
 - *LAGA, Université Paris 13*
Paris (France)
"Wave operators with non-Lipschitz coefficients: energy and observability estimates"
 - *Université Paris 6, Université Paris 7, École Normale Supérieure*
Paris (France)
"Wave operators with non-Lipschitz coefficients: energy and observability estimates"
- 2012** • *Instituto de Ciencias Matemáticas*
Madrid (Spain)
"Persistence of geometric structures for inviscid incompressible fluids"

- *Technische Universität Bergakademie Freiberg*
Freiberg (Germany)
“On the well-posedness for hyperbolic operators with Zygmund coefficients”
 - *Basque Center for Applied Mathematics*
Bilbao (Spain)
“Analysis of models of non-homogeneous fluids and hyperbolic equations”
 - *Karlsruhe Institute of Technology*
Karlsruhe (Germany)
“Second order strictly hyperbolic operators with low regularity coefficients”
- 2011** • *IMB, Université de Bordeaux 1*
Bordeaux (France)
“On the density-dependent incompressible Euler system in Besov spaces”

Research visits

- 2025** *Duke University* (United States) – Invited by A. Kiselev
- 2024** *DMA, École Normale Supérieure* (France) – Invited by I. Gallagher
ICJ, Université Claude Bernard Lyon 1 (France)
- 2023** *Basque Center for Applied Mathematics* (Spain) – BCAM Alumni & Former Members Programme
Imperial College London (United Kingdom) – Invited by E. Zatorska
- 2022** *Dong-a University* (South Korea) – Invited by Y.-S. Kwon
IM, Polish Academy of Sciences (Poland) – Invited by A. Wróblewska-Kamińska
Univeristà di Pisa (Italy) – Invited by F. Colombini
Karlsruhe Institute of Technology (Germany) – Invited by X. Liao and C. Zillinger
Univeristà degli Studi di Trieste (Italy) – Invited by D. Del Santo
- 2021** *LaMME, Université d'Évry* (France) – Invited by D. Chamorro
- 2019** *DMA, École Normale Supérieure* (France) – Invited by I. Gallagher
Center for Mathematical Modeling, Universidad de Chile (Chile) – Invited by C. Muñoz
- 2018** *Cardiff University* (United Kingdom) – Invited by J. Ben-Artzi and B. Morisse
Laboratoire de Mathématiques AGM, Université de Cergy-Pontoise (France) – Invited by C. Prange
DMA, École Normale Supérieure (France) – Invited by I. Gallagher
Univeristà di Pisa (Italy) – Invited by F. Colombini
- 2017** *I2M, Aix-Marseille Université* (France) – Invited by C. Perrin
LAMA, Université Paris-Est Créteil (France) – Invited by R. Danchin
Imperial College London (United Kingdom) – Invited by A. Wróblewska-Kamińska
Universität Würzburg (Germany) – Invited by A. Borzi
Karlsruhe Institute of Technology (Germany) – Invited by R. Mandel
Mathematical Institute, Universität Bonn (Germany) – Invited by X. Liao and H. Koch
IMJ-PRG, Université Paris Diderot (France) – Invited by I. Gallagher
Basque Center for Applied Mathematics (Spain) – Guest of L. Vega

- 2016** *IMB, Université e Bordeaux* (France) – Guest of M. Paicu and G. Métivier
LAMA, Université Savoie Mont Blanc (France) – Guest of D. Bresch and M. Gisclon
IMJ-PRG, Université Paris Diderot (France) – Invited by I. Gallagher
- 2015** *IM, Polish Academy of Sciences* (Poland) – Invited by A. Wróblewska-Kamińska
ICJ, Université Claude Bernard Lyon 1 (France) – Invited by D. Iftimie and S. Benzoni-Gavage
IMB, Université de Bordeaux (France) – Invited by D. Lannes and G. Métivier
- 2014** *LAMA, Université de Savoie* (France) – Invited by D. Bresch
IM, Polish Academy of Sciences (Poland) – Invited by A. Wróblewska-Kamińska
IMB, Université de Bordeaux 1 (France) – Guest of G. Métivier and M. Paicu
- 2013** *Università degli Studi di Trieste* (Italy) – Invited by D. Del Santo
Math. Inst., Academy of Sciences of the Czech Republic (Czech Republic) – Invited by E. Feireisl
IMJ, Université Paris Diderot & Fondation des Sciences Mathématiques de Paris (France)
 Invitation for the project “Instabilities in Hydrodynamics”
- 2012** *ICMAT - Instituto de Ciencias Matemáticas* (Spain) – Invited by A. Castro and D. Córdoba
Technische Universität Bergakademie Freiberg (Germany) – Invited by C. Jäh and M. Reissig
Basque Center for Applied Mathematics (Spain) – Invited by E. Zuazua
- 2011** *IMB, Université de Bordeaux 1* (France) – Invited by M. Paicu

Other stayings

- Mathematisches Forschungsinstitut Oberwolfach* (Germany)
 Oberwolfach Leibniz fellowship (one-month staying) June 2017
- Université Paris-Est Créteil* (France)
 Cotutorial Ph.D. thesis From October 2010 to August 2012
- Università di Pisa* (Italy)
 Invited by F. Colombini (several visits) October 2008 – April 2014

Referee for international journals

SeMA Journal (1)
 J. Math. Pures Appl. (1)
 J. Math. Fluid Mech. (1)
 Mém. Soc. Math. Fr. (1)
 Annales Henri Lebesgue (1)
 Dynamics of PDE (1)
 Proc. Roy. Soc. Edunburgh Sect. A (1)
 Journal of Evolution Equations (2)
 ZAMP (6)
 Annali di Matematica Pura e Applicata (1)
 J. Math. Anal. Appl. (3)
 Boletim da SPM (1)
 Journal of Functional Analysis (1)
 Discrete Contin. Dyn. Syst. – A (2)
 Comm. Partial Differential Equations (1)
 Nonlinearity (6)
 Letters in Mathematical Physics (1)
 Advances in Pure and Applied Mathematics (1)
 Monatshefte für Mathematik (2)
 Acta Applicandae Mathematicae (5)
 Bulletin of the London Mathematical Society (1)

Nonlinear Analysis RWA (1)
 Tunisian Journal of Mathematics (1)
 Asymptotic Analysis (1)
 Applied Mathematics Letters (1)
 Journal of Statistical Physics (1)
 CRAS Mathématiques (1)
 Calc. Var. Partial Differential Equations (2)
 ZAMM (1)
 Acta Mathematica Scientia (1)
 Ann. Inst. H. Poincaré Anal. Non Linéaire (1)
 Nonlinear Analysis (1)
 Revista Matemática Iberoamericana (2)
 Annales Polonici Mathematici (1)
 Journal of the Institute of Mathematics of Jussieu (1)
 Journal of Dynamics and Differential Equations (1)
 SIAM Journal on Mathematical Analysis (5)
 Automatica (1)
 Mathematische Annalen (3)
 Journal of Differential Equations (8)
 Journal of Mathematical Physics (1)

Teaching (selected courses)

Full information available at: <http://math.univ-lyon1.fr/homes-www/fanelli/teaching.html>

- 2023-2024** *Introduction to the mathematical theory of incompressible fluids* (shared with R. LUCÀ)
 “Severo Ochoa course” at BCAM – For second year Master students and Ph.D. students
- 2022-2023** *Starting with PDEs*
 At ÉNS Lyon & UCBL – Refresh course for second year Master students

Algèbre 1B
 At UCBL – For first year Bachelor students
- 2021-2022** *Starting with PDEs*
 At ÉNS Lyon & UCBL – Refresh course for second year Master students

Fondamentaux de Mathématiques (Analysis I & Algebra I)
 At UCBL – For first year Bachelor students
- 2020-2021** *Fondamentaux de Mathématiques* (Analysis I & Algebra I)
 At UCBL – For first year Bachelor students
- 2019-2020** *Evolution equations*
 At ÉNS Lyon & UCBL – For second year Master students

Fondamentaux de Mathématiques (Analysis I & Algebra I)
At UCBL – For first year Bachelor students

2018-2019 *Evolution equations*
At ÉNS Lyon & UCBL – For second year Master students

2017-2018 *Analysis tools for PDEs*
At ÉNS Lyon & UCBL – Refresh course for second year Master students

Other scientific activities

ONGOING

▷ Reviewer for *Mathematical Reviews - AMS* – From May 2012

PAST

- ▷ President of Baccalaureate Committee – July 2016
Professional baccalaureate at Lycée “Jean Lurcat” - 69008 Lyon
- ▷ ICJ webpage – December 2015 - March 2016
Participation in a working group for the realization of the new webpage of the laboratory
- ▷ Member of GNAMPA group of *INdAM* – January 2010 - December 2015

Dissemination activities

- Participation in “Math-dating”, in the occasion of the π -day
Event organised by the MMI - Maison des Mathématiques et de l’Informatique – Lyon (France), March 2022
- “Euler, Navier et Stokes aux prises avec les variations de densité”
Théminaire de l’UMPA, ÉNS Lyon – Lyon (France), February 2020
- “Petite histoire d’un mathématicien après la thèse”
Journée d’accueil des nouveaux doctorants de l’ÉD InfoMaths – Villeurbanne (France), November 2019
- “La Matematica: un nuovo punto di vista”
Popularization speech at the high school I.I.S. “Savoia Benincasa” – Ancona (Italy), February 2018
- Participation in *Math α Lyon*, January 2016
(vulgarization activity addressed to students from middle and high schools in Lyon area)
- “Euler aux prises avec les variations de densité” (vulgarization article) – with Raphaël Danchin
MPT 2013 (french blog of the international <http://www.mpe2013.org>), September 2013
(<http://images.math.cnrs.fr/Euler-aux-prises-avec-les>)
- “On the density-dependent incompressible Euler system in Besov spaces” (poster)
Mathflows 2012, Porquerolles (France), October 2012
- “On the density-dependent incompressible Euler system in Besov spaces” (poster)
EVEQ 2012, Prague (Czech Republic), July 2012

Languages

Italian (native speaker)

English (fluent)

French (fluent)

Spanish (fluent)

Basque (beginner)