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Personal

Born July 11, 1979.
Italian citizen.

Employment

From 2011 Assistant Professor (*Ricercatrice*), IMATI-CNR, Pavia, Italy
2010-2011 Postdoc, University of Zurich, Switzerland
2008-2010 Postdoc, De Giorgi Center, Scuola Normale Superiore, Pisa, Italy
2006-2008 Boas Assistant Professor, Northwestern University, Evanston (IL), USA

Education

2017 Italian National Habilitation as Associate Professor
Area: A1/03 (Mathematical Analysis, Probability and Statistics)
2006 PhD in Functional Analysis and Applications, SISSA, Trieste, Italy
Advisor: Prof. Stefano Bianchini
Thesis: Parabolic approximation of hyperbolic initial-boundary value problems
2002 M.S. in Mathematics, University of Pavia, Italy
Advisor: Prof. Giuseppe Savaré
Thesis: On the dependence of elliptic equations eigenvalues on domain perturbations
Final grade: 110/110, with honour

Long Visits

March 2017 University of Padua, Italy
February-May 2016 University of Basel, Switzerland
April-May 2015 University of Basel, Switzerland
March 2013 SISSA, Trieste, Italy
September 2008 University of Parma, Italy
July 2007 Fudan University, Shanghai, China
June 2007 SISSA, Trieste, Italy
April 2007 Pennsylvania State University, State College (PA), USA
May 2006 Pennsylvania State University, State College (PA), USA

Honors and Awards

Invited speaker *HYP2014, the 15th International Conference on Hyperbolic Problems*,
IMPA, Rio de Janeiro, Brazil

Research area

Partial Differential Equations. Main research interests:

conservation laws
transport equations with low regularity coefficients
eigenvalue problems for elliptic equations
ordinary differential equations with singularity

Publications

Preprints

Initial-boundary value problems for nearly incompressible vector fields, and applications to the Keyfitz and Kranzer system

(with Anupam Pal Choudhury and Gianluca Crippa)

Submitted. Also ArXiv:1610.00188

Quantitative estimates on localized finite differences for the fractional Poisson problem, and applications to regularity and spectral stability

(with Goro Akagi, Giulio Schimperna and Antonio Segatti)

Submitted. Also ArXiv:1606.06489

A mathematical model for piracy control through police response

(with Giuseppe M. Coclite and Mauro Garavello)

NoDEA Nonlinear Differential Equations Appl. To appear.

Optimal strategies for a time-dependent harvesting problem

(with Giuseppe Coclite and Mauro Garavello)

Discrete Contin. Dyn. Syst. Ser. S. To appear. Also ArXiv:1602.05737

Journal papers

Optimality of integrability estimates for advection-diffusion equations

(with Stefano Bianchini, Maria Colombo and Gianluca Crippa)

NoDEA Nonlinear Differential Equations Appl. 24 (2017), no. 4, 24:33

Schaeffer's regularity theorem for scalar conservation laws does not extend to systems

(with Laura Caravenna)

Indiana Univ. Math. J. 66 (2017) no. 1, 101-160.

New interaction estimates for the Baiti-Jenssen system

(with Laura Caravenna)

Netw. Heterog. Media 11 (2016), no. 2, 263-280

Accurate numerical schemes for approximating initial-boundary value problems for systems of conservation laws

(with Siddhartha Mishra)

J. Hyper. Differential Equations 12 (2015), no. 1, pp. 61-86

Initial-boundary value problems for continuity equations with BV coefficients

(with Gianluca Crippa and Carlotta Donadello)

J. Math. Pures Appl. (9) 102 (2014), no. 1, 79-98.

On the extension property of Reifenberg-flat domains

(with Antoine Lemenant and Emmanouil Milakis)

Ann. Acad. Sci. Fenn. Math. 39 (2014), 51-71.

Boundary layers for self-similar viscous approximations of nonlinear hyperbolic systems
(with Cleopatra Christoforou)
Quart. Appl. Math. 71 (2013), 433-453.

Spectral stability estimates for the Dirichlet and Neumann Laplacian in rough domains
(with Antoine Lemenant and Emmanouil Milakis)
J. Funct. Anal. 264 (2013), no. 9, 2097-2135

A uniqueness criterion for viscous limits of boundary Riemann problems
(with Cleopatra Christoforou)
J. Hyperbolic Differ. Equ. 8 (2011), no. 3, 507-544

Invariant manifolds for a singular ordinary differential equation
(with Stefano Bianchini)
J. Differential Equations 250 (2011), no. 4, 1788-1827.

Some new well-posedness results for continuity and transport equations, and applications to the chromatography system
(with Luigi Ambrosio, Gianluca Crippa and Alessio Figalli)
SIAM J. Math. Anal. 41 (2009), no. 5, 1890-1920.

A connection between viscous profiles and singular ODEs
(with Stefano Bianchini)
Rend. Istit. Mat. Univ. Trieste 41 (2009), 35-41

The boundary Riemann solver coming from the real vanishing viscosity approximation
(with Stefano Bianchini)
Arch. Ration. Mech. Anal. 191 (2009), no. 1, 1-96.

Vanishing viscosity solutions of a 2×2 triangular hyperbolic system with Dirichlet conditions on two boundaries
Indiana Univ. Math. J. 56 (2007), no. 1, 279-364.

Conference proceedings

An overview on the approximation of boundary Riemann problems through physical viscosity
(with Stefano Bianchini)
Bull. Braz. Math. Soc. (N.S.) 47 (2016), no. 1, 131-142.

A counter-example concerning regularity properties for systems of conservation laws
(with Laura Caravenna)
Proc. Appl. Math. Mech., 15: 625-626.

A note on the initial-boundary value problem for continuity equations with rough coefficients
(with Gianluca Crippa and Carlotta Donadello)
Hyperbolic problems: theory, numerics and applications, pp. 957-966, AIMS Series on Appl. Math., 8, 2014.

On the physical and the self-similar viscous approximation of a boundary Riemann problem
(with Cleopatra Christoforou)
Riv. Math. Univ. Parma (N.S.) 3 (2012), 41-54.

Existence and uniqueness results for the continuity equation and applications to the chromatography system
(with Luigi Ambrosio, Gianluca Crippa and Alessio Figalli)
Nonlinear conservation laws and applications, 195-204, IMA Vol. Math. Appl., 153, Springer, New York, 2011

Notes on the study of the viscous approximation of hyperbolic problems via ODE analysis
 Riv. Math. Univ. Parma (N.S.) 1 (2010), no. 1, 151-188.

An overview on some results concerning the transport equation and its applications to conservation laws
 (with Gianluca Crippa)
 Commun. Pure Appl. Anal. 9 (2010), no. 5, 1283-1293

Invariant manifolds for viscous profiles of a class of mixed hyperbolic-parabolic systems
 (with Stefano Bianchini)

Hyperbolic problems: theory, numerics and applications, 419-428, Proc. Sympos. Appl. Math., 67, Part 2, Amer. Math. Soc., Providence, RI, 2009

Seminar and talks

Invited course at a conference

Seventh Meeting on Hyperbolic Conservation Laws and Fluid Dynamics
 August 31- September 4, 2009, SISSA, Trieste, Italy

Invited seminars

- 2017 NTNU, Trondheim, Norway (May 24)
 University of Padua, Italy (March 15)
- 2016 University of Zurich, Switzerland (May 26)
- 2015 University Carlos III, Madrid (November 12)
 University of Bari, Italy (October 7)
 University of Basel, Switzerland (April 22)
 GSSI, L'Aquila, Italy (March 5)
- 2014 *Franco-Italian Seminar*-joint seminar of IMATI, Pavia and LJLL, Paris (December 5)
 King's College London, UK (May 15)
- 2013 University of Milan Bicocca, Italy (January 23)
- 2012 University of Basel, Switzerland (November 7)
 University of Oxford, UK (September 19)
 University of Pavia, Italy (June 19)
 Center of Mathematics for Applications, Oslo, Norway (May 22)
 Max Planck Institute, Leipzig, Germany (February 14)
- 2011 *Zurich Graduate Colloquium*, Zurich, Switzerland (November 29)
 ETH Zurich, Switzerland (April 7, 2011)
Nonlinear analysis and PDEs seminar (joint seminar of ENS, University of Paris 6 and University of Paris 7),
 Paris, France (March 1)
- 2010 University of Franche-Comté, Besançon, France (December 16)
 ETH Zurich, Switzerland (December 13)
 University of Padua, Italy (September 15)
- 2009 University of Zurich, Switzerland (December 16)
 University of Pisa, Italy (January 22)
- 2008 University of Parma, Italy (September): mini course (6 seminars)
 University of Houston, USA (February 28)
- 2007 University of Bologna, Italy (December 18)
 Fudan University, Shanghai, China (July 17)
 Fudan University, Shanghai, China (July 11)

- 2006 University of Brescia, Italy (December 22)
Northwestern University, Evanston (IL), USA (November 16)
Northwestern University, Evanston (IL), USA (May 25)
SISSA, Trieste, Italy (March 28)
- 2005 University of Pavia, Italy (December 13)

Invited talks at conferences

- 2017 *Irregular transport: analysis and applications*
June 26-30, University of Basel, Switzerland
Workshop on Ideal Fluids and Transport
February 13-15, Banach Center, Warsaw, Poland
- 2016 SIMAI 2016 (minisymposium on Analysis and numerics for the modeling through conservation laws)
September 13-16, Politecnico, Milano, Italy
11th AIMS Conference on Dynamical Systems, Differential Equations
(Special Session on Recent Developments Related to Conservation Laws and Hamilton-Jacobi Equations)
July 1-5, Orlando, USA
11th Meeting on Nonlinear Hyperbolic PDEs and Applications
June 13-17, SISSA, Trieste, Italy
- 2015 *Contemporary Topics in Conservation Laws*
February 9-12, University of Franche-Comté, Besançon, France
- 2014 HYP2014, 15th International Conference on Hyperbolic Problems (invited speaker)
July 28-August 1, IMPA, Rio de Janeiro, Brazil
SIMAI 2014 (minisymposium on Models and Applications of the Theory of Conservation Laws)
July 7-10, Taormina, Italy.
Workshop on Analysis of PDEs: Theory, Methods and Applications
June 29-July 3, Protaras, Cyprus.
- 2013 *Tenth Meeting on Hyperbolic Conservation Laws* (plenary speaker)
July 11-12, University of L'Aquila, Italy
- 2011 *Ninth Meeting on Hyperbolic Conservation Laws and Fluid Dynamics*
July 18-22, SISSA, Trieste, Italy
- 2010 *Conference on Control of PDEs*
January 25-29, CIRM, Luminy, Marseille, France.
- 2009 *Nonlinear Conservation Laws and Related Problems*
October 4-9, BIRS, Banff, Canada
IMA summer program on Nonlinear Conservation Laws and Applications
July 13-31, IMA, Minneapolis, USA.
- 2008 *First Joint Meeting of the AMS and Shanghai Mathematical Society*
(Special Session on Nonlinear Systems of Conservation Laws and Related Topics)
December 17-21, Fudan University, Shanghai, China.
- 2007 *Equadiff 07 (Minisymposium on hyperbolic conservation laws)*
August 5-11, Vienna University of Technology, Vienna, Austria
AMS 2007 Fall Central Section Meeting
(Special Session on Nonlinear Conservation Laws and Related Problems)
October 5-6, De Paul University, Chicago, USA.
Fifth Meeting on Hyperbolic Conservation Laws
June 21-22, SISSA, Trieste, Italy

- 2006 *Hyperbolic Systems of Conservation Laws and Related Problems*
 October 28-November 2, BIRS, Banff, Canada
 Mathematics and its applications
 (Special Session on Hyperbolic and Transport Problems)
 July 3-7, Turin, Italy
- 2005 *Fourth Meeting on Hyperbolic Conservation Laws*
 June 13-14, SISSA, Trieste, Italy

Teaching

- Fall 2016: *Instructor*, University of Pavia, Italy
 Analysis II (for Engineering students)
- Spring 2016: *Instructor*, University of Basel, Switzerland
 Functional Analysis
- 2013-2015: *Teaching Assistant*, University of Pavia, Italy
 Fall 2015: Analysis I (for Engineering students)
 Fall 2014: Analysis I (for Engineering students)
 Fall 2013: Analysis I (for Engineering students)
- Spring 2013: *Instructor*, SISSA, Trieste, Italy
 Systems of conservation laws in one space variable (graduate course)
- 2010-2011: *Teaching Assistant*, University of Zurich, Switzerland,
 Second semester: Analysis II
 First semester: Analysis I
- 2006-2008 *Instructor*, Northwestern University, Evanston (IL), USA
 Spring 2008: Linear Algebra, Second Course, 1 section
 Winter 2008: Multiple Integration and Vector Calculus, 1 section
 Fall 2007: Differential Calculus of Multivariable Functions, 2 sections
 Winter 2007: Differential Calculus of Multivariable Functions, 2 sections
 Fall 2006: Differential Calculus of Multivariable Functions, 2 sections
- 2001-2002: *Teaching Assistant*, University of Pavia, Italy
 Second Semester: Analysis I, part 2
 First Semester: Analysis I, part 1

Collaboration with research projects

- PRIN 2015 Title: *Hyperbolic Systems of Conservation Laws and Fluid Dynamics: Analysis and Applications*
 PI: Stefano Bianchini
- ERC Starting Grant 2015 FLIRT
 Title: *Fluids Flows and Irregular Transport*
 PI: Gianluca Crippa
- GNAMPA Project 2016 Title: *Buona positura, controllo, proprietà qualitative e schemi numerici per equazioni quasi lineari*
 Coordinator: Laura Caravenna
- GNAMPA Project 2105 Title: *Regolarità, unicità per equazioni di tipo iperbolico e problemi di controllo*
 Coordinator: Laura Caravenna

2014-2015 CNR-JSPS Project	Joint Project CNR-JSPS (Japanese Society for Promotion of Science) Title: <i>Innovative variational methods for evolution equations</i> PI: Goro Akagi (JSPS) and Ulisse Stefanelli (CNR).
PRIN 2012	Title : <i>Nonlinear hyperbolic partial differential equations, dispersive and transport equations: theoretical and applicative aspects</i> PI: Stefano Bianchini
GNAMPA Project 2013 (project coordinator)	Title: <i>Proprietà qualitative e criteri di unicità per problemi di tipo iperbolico</i>

Professional service

Organization of conferences and workshops

Local Organizer (with Fabio Cavalletti, Gianluca Crippa, Antonio Segatti and Rafael Vázquez),
IperPV2017, XVII Italian Meeting on Hyperbolic Equations, September 6-8, 2017, Pavia, Italy.

Organizer (with Pierluigi Colli and Elisabetta Rocca),
Special afternoon on Diffuse Interface Models and Related Problems, February 7, 2017, Pavia, Italy.

Organizer (with Gianluca Crippa and Enrico Valdinoci),
Workshop on recent trends in the analysis of PDEs, October 19-21, 2016, IMATI-CNR, Pavia, Italy.

Organizer (with Gianluca Crippa and Stefano Spirito),
GSSI Summer School on Fluid Dynamics and Related Topics, July 18-22, 2016, GSSI, L'Aquila, Italy.

Scientific Organizer (with Fabio Cavalletti),
Junior session on nonlinear hyperbolic equations and related topics,
Special Session of the 11th AIMS Conference, July 1-5, 2016, Orlando (FL), USA.

Organizer (with Pierluigi Colli, Elisabetta Rocca and Antonio Segatti),
Perspectives in Applied PDEs: a day in Pavia, February 9, 2016, Pavia, Italy.

Local Organizer (with Rafael Vázquez),
Lions-Magenes Days, April 13-14, 2015, Pavia, Italy.

Other professional service

PhD Thesis Referee

Candidate: Anders Nordli, NTNU, Trondheim, Norway.

Defence: May 26, 2017

Referee for the following journals: *Acta Applicandae Mathematicae*, *Advances in Mathematics*, *Archive for Rational Mechanics and Analysis*, *Calculus of Variations and Partial Differential Equations*, *Communications on Pure and Applied Analysis*, *Discrete and Continuous Dynamical Systems*, *Differential and Integral Equations*, *Journal of Differential Equations*, *Journal of Elasticity*, *Journal of Functional Analysis*, *Mathematical Methods in Applied Sciences*, *Mathematical Models and Methods in Applied Sciences*, *Proceedings of the AMS*, *Zeitschrift für angewandte Mathematik und Physik*.