

Andrea Tellini

Curriculum Vitae

Departamento de Matemática Aplicada
a la Ingeniería Industrial
Universidad Politécnica de Madrid
E.T.S. Ingeniería y Diseño Industrial
Ronda de Valencia 3, 28012 Madrid (Spain)

☎ +34 91 06 77 767

✉ andrea.tellini@upm.es

🌐 www.andreatellini.weebly.com

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Personal information

Place and date of birth

Udine (Italy), 9th January 1986

Citizenship

Italian

Present Position

Sept 2018– Assistant Professor at Politecnic University of Madrid

Past Positions

- Feb 2017– Post-doc researcher (Juan de la Cierva incorporación program) at Department of Mathematics (Universidad Autónoma de Madrid), Tutor: Prof. Carlos Mora Corral
- Aug 2018
- Oct 2014– Post-doc researcher at Centre d'Analyse et de Mathématique Sociales, École des Hautes Études en Sciences Sociales, Paris, Responsible: Prof. Henri Berestycki
- Jan 2017
- Oct 2010– Trainee researcher at Universidad Complutense de Madrid (Spain)
- Sept 2014

Habilitations

- June 2017 Acreditaciones ANECA (Spain) *Profesor Contratado Doctor* and *Profesor Universidad Privada*
- Feb 2015 Qualification of the *Conseil National des Universités* (France) for *Maître de conférences*
- Oct 2014 Acreditación ANECA (Spain) *Profesor Ayudante Doctor*

Education

- 2011–2013 **Ph.D. in Mathematics**, *Universidad Complutense de Madrid*, Madrid.
Passed *cum laude* and European Doctorate Mention
Supervisors: J. López-Gómez, M. Molina-Meyer
- 2010–2011 **Master in Mathematical Research**, *Universidad Complutense de Madrid*, Madrid.
Mark of the final dissertation: 10/10 *cum laude*

- 2005–2010 **Diploma Scuola Superiore**, *Scuola Superiore dell'Università degli Studi di Udine*, Udine.
Mark: 110/110 *cum laude*
- 2008–2010 **Master in Mathematics**, *Università degli Studi di Udine*, Udine.
Mark: 110/110 *cum laude*
- 2005–2008 **Bachelor in Mathematics**, *Università degli Studi di Udine*, Udine.
Mark: 110/110 *cum laude*

Research interests

Partial differential equations, Reaction-diffusion equations, propagation speeds in heterogeneous environments, comparison methods, multiplicity in superlinear indefinite elliptic problems, continuation methods, topological methods.

Ordinary differential equations, Topological methods, qualitative behavior of solutions.

Variational methods in nonlocal problems, Optimality conditions for Young measures, relaxation.

Numerical analysis, Path following, numerical bifurcation diagrams, spectral methods.

Mathematical modelling, Models in ecology, epidemiology and medicine.

Papers and preprints

- [1] **G. Feltrin, E. Sovrano and A. Tellini**, *On the number of positive solutions to an indefinite parameter-dependent Neumann problem*, Preprint available at [arXiv:2101.03313](https://arxiv.org/abs/2101.03313) [math.AP].
- [2] **A. Tellini**, *Numerical global bifurcation diagrams for a superlinear indefinite problem with a parameter appearing in the domain*, *Rendiconti dell'Istituto di Matematica dell'Università di Trieste*, **52** (2020) 289–309, Available [here](#).
- [3] **B. Bogosel, T. Giletti and A. Tellini**, *Propagation for KPP bulk-surface systems in a general cylindrical domain*, Preprint available at [arXiv:2006.14224](https://arxiv.org/abs/2006.14224) [math.AP].
- [4] **C. Mora-Corral and A. Tellini**, *Relaxation of a scalar nonlocal variational problem with a double-well potential*, *Calculus of Variations and Partial Differential Equations* **59**, Article number: 67 (2020).
- [5] **H. Berestycki, L. Rossi and A. Tellini**, *Coupled reaction-diffusion equations on adjacent domains*, Preprint available at [arXiv:1903.11717](https://arxiv.org/abs/1903.11717) [math.AP].
- [6] **A. Tellini**, *Comparison among several planar Fisher-KPP road-field systems*, in *Springer INdAM Series*, Vol. 33, Serena Dipierro Editor, 2019, 481–500.
- [7] **A. Tellini**, *High multiplicity of positive solutions for superlinear indefinite problems with homogeneous Neumann boundary conditions*, *J. Math. Anal. Appl.*, **467** (2018) 673–698.
- [8] **L. Rossi, A. Tellini and E. Valdinoci**, *The effect on Fisher-KPP propagation in a cylinder with fast diffusion on the boundary*, *SIAM J. Math. Anal.*, **49** (2017), 4595–4624.

- [9] **A. Tellini**, *Propagation speed in a strip bounded by a line with different diffusion*, Journal of Differential Equations, **60** (2016), 5956–5986.
- [10] **A. Tellini**, *Imperfect bifurcations via topological methods in superlinear indefinite problems*, Discrete Contin. Dyn. Syst., Dynamical systems, differential equations and applications. 10th AIMS Conference. Suppl. (2015), 1050–1059.
- [11] **J. López-Gómez, M. Molina-Meyer and A. Tellini**, *Spiraling bifurcation diagrams in superlinear indefinite problems*, Discrete and Continuous Dynamical Systems A, **35** (2015), 1561–1588.
- [12] **J. López-Gómez and A. Tellini**, *Generating an arbitrarily large number of isolas in a superlinear indefinite problem*, Nonlinear Analysis Series A: Theory, Methods & Applications, **108** (2014), 223–248.
- [13] **J. López-Gómez, M. Molina-Meyer and A. Tellini**, *Intricate dynamics caused by facilitation in competitive environments within polluted habitat patches*, European Journal of Applied Mathematics **25** (2014), 213–229.
- [14] **J. López-Gómez, A. Tellini and F. Zanolin**, *High multiplicity and complexity of the bifurcation diagrams of large solutions for a class of superlinear indefinite problems*, Communications on Pure and Applied Analysis **13** (2014), 1–73.
- [15] **J. López-Gómez, M. Molina-Meyer and A. Tellini**, *Intricate bifurcation diagrams for a class of one-dimensional superlinear indefinite problems of interest in population dynamics*, Dynamical Systems and Differential Equations, DCDS Supplement 2013 Proceedings of the 9th AIMS International Conference (Orlando, Florida, USA), 515–524.
- [16] **J. López-Gómez, M. Molina-Meyer and A. Tellini**, *The uniqueness of the linearly stable positive solution for a class of superlinear indefinite problems with nonhomogeneous boundary conditions*, Journal of Differential Equations **255** (2013), 503–523.

Academic Production

Ph.D. Thesis

Title	<i>Mathematical analysis and numerical treatment of a class of superlinear indefinite boundary value problems of elliptic type</i>
Supervisors	Professors Julián López Gómez and Marcela Molina Meyer
Jury	Paul Rabinowitz (<i>University of Wisconsin - Madison</i>), Jean Mawhin (<i>Université Catholique de Louvain</i>), Fabio Zanolin (<i>Università degli Studi di Udine</i>), Carlos Fernández Pérez (<i>Universidad Complutense de Madrid</i>), Mihaela Negreanu Pruna (<i>Universidad Complutense de Madrid</i>).
External referees	Duccio Papini (<i>Università degli studi di Siena</i>), Laurent Véron (<i>Université François Rabelais - Tours</i>)
Link	http://eprints.ucm.es/23420/1/T34870.pdf

Master Thesis (Universidad Complutense de Madrid)

Title	<i>Multiplicity of positive large solutions in a superlinear indefinite problem</i>
Supervisor	Professor Julián López Gómez

Master Thesis (Università degli Studi di Udine)

Title *Positive blow-up solutions for a class of nonlinear differential equations*
Supervisors Professors Fabio Zanolin and Julián López Gómez

Bachelor Thesis (Università degli Studi di Udine)

Title *Persistence in continuous dynamical systems, with applications to population dynamics*
Supervisor Professor Fabio Zanolin

Grants

- Feb 2017 – Jan 2019 PostDoc Contract Juan de la Cierva Incorporación (Ministry of Economy, Industry and Competitiveness, Spain)
- Oct 2014– March 2016 PostDoc project of the Institute of Complex Systems of Île de France (Supervisor Prof. Henri Berestycki)
- Oct 2010– Sept 2014 FPI Doctoral Grant (Trainee researcher) of the Ministry of Economy and Competitiveness of the Government of Spain (former Ministry of Science and Innovation)
- 2005–2010 Grant of the *Scuola Superiore dell'Università degli Studi di Udine - Classe scientifico-economica*, given at the beginning of the bachelor studies to at most 10 students who pass a written and oral examination, much like the *Scuola Normale Superiore di Pisa*

Academic Visits

- 23/09/19– 25/10/19 Research visit at Università degli Studi di Udine, Udine (Italy)
- 11/07/18– 30/07/18 Research visit at Harbin Institute of Technology, Harbin (China)
- 25/08/13– 23/11/13 Research period at the “Centre d'Analyse et Mathématique Sociales”(Paris), supervision of Prof. H. Berestycki
- 13/01/13– 13/04/13 Research period at the “Centre d'Analyse et Mathématique Sociales”(Paris), supervision of Prof. H. Berestycki
- 09/09/09– 28/02/10 Erasmus at the Faculty of Mathematics, Universidad Complutense de Madrid, supervision of Prof. J. López Gómez

Participation in research projects

- Oct 2010– Dec 2012 MTM2009-08259 “Metasolutions in spatial ecology”, Ministry of Science and Innovation (Spain)
- Jan 2013– Dec 2015 MTM2012-30669 “Nonlinear elliptic and parabolic equations”, Ministry of Economy and Competitiveness (Spain)
- Oct 2014 – Jan 2019 “ReaDi: Reaction Diffusion Equations, Propagation and Modelling”, ERC (European Research Council)
- Jan 2016– Dec 2018 MTM2015-65899-P “Nonlinear Elliptic and Parabolic Problems”, Ministry of Economy and Competitiveness (Spain)

Jan 2019– PGC2018-097104-B-100, Ministry of Science, Innovation and Universities (Spain)
Dec 2021

Peer reviewing activity

Journals Nonlinear Analysis: Theory, Methods & Applications, Journal of Differential Equations, Communications on Pure and Applied Analysis, European Journal of Applied Mathematics, Annali di Matematica Pura ed Applicata, NoDEA Nonlinear Differential Equations and Applications, Journal of Mathematical Biology, Rendiconti dell'Istituto di Matematica dell'Università di Trieste, Discrete and Continuous Dynamical Systems Series B

Reviewing activity

Mathematical Reviews (American Mathematical Society), zbMath

Talks

- 16/10/19 Enhancement of the Fisher-KPP propagation speed through heterogeneities in adjacent domains, *Seminar of the Department of Mathematics, Computer Science and Physics* (Università degli Studi di Udine, Italy)
- 09/10/19 Classical results on propagation for the nonlinear heat equation, *Seminar of the Department of Mathematics, Computer Science and Physics* (Università degli Studi di Udine, Italy)
- 07/03/19 Relaxation of double-well potentials in nonlocal variational problems, *International workshop on nonlinear partial differential equations* (Universidad Complutense de Madrid, Spain)
- 24/01/19 High Multiplicity for Superlinear Indefinite Problems with Neumann Boundary Conditions, *International workshop on sharp dynamics of differential equations and systems* (Universidad Complutense de Madrid, Spain)
- 18/07/18 Road-field systems in domains with bounded section, *Seminar of the Department of Mathematics* (Harbin Institute of Technology, China)
- 07/07/18 Propagation Enhancement for Fisher-KPP Problems with Diffusion and Reaction Heterogeneities in Adjacent Domains, *12th AIMS international conference on Dynamical Systems, Differential Equations and Applications, Taipei (Taiwan)*, Invited talk in Special Session "Propagation Dynamics in Nonlinear Evolution Systems"
- 06/07/18 High Multiplicity of Positive Solutions for Superlinear Indefinite Problems with Neumann Boundary Conditions, *12th AIMS international conference on Dynamical Systems, Differential Equations and Applications, Taipei (Taiwan)*, Invited Talk in Special Session "Nonlinear Elliptic and Parabolic Problems"
- 14/02/18 Comparison principles: differential equations and beyond, *Junior Seminar* (ICMAT, Madrid, Spain)
- 21/12/17 Reaction-diffusion systems with heterogeneities in adjacent domains, *Workshop on Nonlinear Differential Equations*" (University of Trieste, Italy), Invited

- 23/11/17 Reaction-diffusion systems with heterogeneities in adjacent domains, *International conference "Reaction-diffusion, Propagation, Modelling"* (Henri Poincaré Institute, Paris), Invited
- 05/09/17 Enhancement of Fisher-KPP propagation through lines and strips of fast diffusion, *IV Conference of the Royal Spanish Mathematical Society of young researchers* (Valencia, Spain), Invited talk in the Special Session "PDEs and applications"
- 07/07/17 Effects of large diffusion on the boundary for Fisher-KPP systems, *Workshop on Nonlinear Partial Differential Equations*, Universidad Complutense de Madrid (Spain), Invited
- 08/06/17 Enhancement of Fisher-KPP propagation through lines and strips of fast diffusion, *Seminar of nonlinear diffusion*, Universidad Autónoma de Madrid (Spain), Invited
- 31/05/17 Enhancement of Fisher-KPP propagation through lines and strips of fast diffusion, *Conference "Contemporary Research in elliptic PDEs and related topics"*, Università di Bari (Italy) - INdAM intensive research period, Invited
- 05/04/17 Aceleración de la propagación de tipo Fisher-KPP a través de líneas de difusión rápida, *Seminar of the group "Optimización y métodos variacionales"*, Universidad de Castilla La Mancha (Ciudad Real, Spain), Invited
- 22/12/16 High multiplicity of positive solutions for a superlinear indefinite problem with Neumann boundary conditions, *Workshop of the INdAM-GNAMPA project "Nonlinear differential problems: existence, multiplicity and qualitative properties of the solutions"*, University of Udine (Italy), Invited
- 14/12/16 Enhancement of Fisher-KPP propagation through lines and strips of fast diffusion, *Colloquium of the Department of Mathematics*, University of Miami (USA), Invited
- 04/07/16 Acceleration of Fisher-KPP propagation in presence of reaction and diffusion heterogeneities, *11th AIMS international conference on Dynamical Systems, Differential Equations and Applications, Orlando (USA)*, Invited talk in Special Session "New Trends in Nonlinear Partial Differential Equations and Applications"
- 01/07/16 Global bifurcation diagrams for problems with sign-changing nonlinearities with high multiplicity of solutions, *11th AIMS international conference on Dynamical Systems, Differential Equations and Applications, Orlando (USA)*, Talk in Special Session "Qualitative properties of nonlinear differential equations of elliptic and parabolic type"
- 05/04/16 Accélération de la propagation Fisher-KPP en présence d'hétérogénéités, *Institut de Mathématiques de Marseille (Marseille, France)*, Applied Analysis Seminar, Invited
- 23/03/16 Accélération de la propagation Fisher-KPP en présence d'hétérogénéités, (*Bordeaux, France*), Workshop of young french researchers on PDEs, Invited
- 28/01/16 Diagrammes de bifurcation complexes pour des équations logistiques de type indéfini, *Institut de Mathématiques de Bordeaux (Bordeaux, France)*, Analysis Seminar, Invited
- 19/12/15 Bifurcation diagrams for superlinear indefinite problems with asymmetric weights, *Universidad Complutense de Madrid (Spain)*, Workshop on Nonlinear Partial Differential Equations

- 13/10/15 Global bifurcation diagrams for superlinear indefinite problems with high multiplicity of solutions, *Institut Elie Cartan de Lorraine (Nancy, France)*, PDE Seminar, Invited
- 12/10/15 Acceleration of Fisher-KPP propagation due to heterogeneities on the boundary, *Laboratoire Amiénois de Mathématique Fondamentale et Appliquée (Amiens, France)*, Analysis Seminar A³, Invited
- 10/09/15 Global bifurcation diagrams for superlinear indefinite problems with high multiplicity of solutions, *XX Conference of the Italian Mathematical Union*, Special Session on Ordinary Differential Equations, Invited Talk
- 19/06/15 Acceleration of Fisher-KPP propagation due to heterogeneities on the boundary, *Universidad Complutense de Madrid (Spain)*, Workshop on Nonlinear Partial Differential Equations
- 06/02/15 Propagation in a cylinder with fast diffusion and transport on the boundary, *Universidad Complutense de Madrid (Spain)*, Seminar of the Department of Applied Mathematics
- 06/11/14 The effect of two roads with fast diffusion on Fisher-KPP propagation, *ERC ReaDi Seminar, Paris, EHESS*, Short Seminar
- 06/10/14 Global bifurcation diagrams for superlinear indefinite problems with high multiplicity of solutions, *ERC ReaDi Workshop, Paris, EHESS*, Long Seminar
- 23/09/14 The effect of fast diffusion occurring on sub-environments of lower spatial dimension, *Workshop of Young Researchers in Mathematics, Universidad Complutense de Madrid*, Invited Talk
- 07/07/14–
11/07/14 The effect of two roads with fast diffusion on Fisher-KPP propagation, *10th AIMS international conference on Dynamical Systems, Differential Equations and Applications, Madrid (Spain)*, Invited talk in Special Session “Nonlinear elliptic and parabolic problems”
- 27/11/13 High multiplicity for superlinear indefinite problems, *Universidad Complutense de Madrid (Spain)*, Seminar of the Department of Applied Mathematics, Invited Seminar
- 21/10/13 High multiplicity for superlinear indefinite problems, *Università degli Studi di Padova (Italy)*, Seminar of differential equations and applications
- 18/10/13 How a line bounding a strip-shaped field affects Fisher-KPP propagation, *Università degli Studi di Trieste (Italy)*, Seminar
- 25/09/13 How a line bounding a strip-shaped field affects Fisher-KPP propagation, *Journées ERC ReaDi (European Research Council's Project Reaction Diffusion Equations), Paris, EHESS*, Invited Talk
- 17/07/13 Intricate dynamics in superlinear indefinite problems, *Giornate non lineari, Università degli Studi di Torino*, Invited Talk
- 19/06/13 Intricate dynamics caused by facilitation in polluted habitats, *Workshop on nonlinear PDEs, Universidad Complutense de Madrid*, Plenary Talk
- 13/06/13 Intricate dynamics in superlinear indefinite problems, *Seminar of the Group of Applied Mathematical Analysis (GAMA), University Carlos III Madrid*, Seminar
- 27/03/13 Intricate dynamics caused by facilitation in polluted habitats, *Workgroup on nonlinear PDEs of the Centre d'Analyse et Mathématique Sociales (Paris)*, Seminar

- 01/07/12– Theoretical and numerical analysis of complex bifurcation diagrams related to a class of superlinear indefinite problems, *9th AIMS international conference on Dynamical Systems, Differential Equations and Applications, Orlando (Florida, USA)*, Invited talk in Special Session “Nonlinear elliptic and parabolic problems”
- 05/07/12
- 29/09/11 Complexity of the global bifurcation diagrams of large solutions for a class of superlinear indefinite equations, *Workshop on Nonlinear Partial Differential Equations, Universidad Complutense de Madrid*, Plenary Talk
- 22/09/11 Multiplicity of positive large solutions in a superlinear indefinite problem, *Workshop of Young Researchers in Mathematics, Universidad Complutense de Madrid*, Plenary Talk
- 09/05/11 Some multiplicity results for a class of superlinear indefinite problems, *Workshop on Nonlinear Partial Differential Equations, Universidad Complutense de Madrid*, Plenary Talk

Teaching experience

- Jan 2020 – Theory and exercises of Complements of Mathematics, 1st year of the Bachelor Degree in Electrical Engineering at Universidad Politécnica de Madrid, *70 hours*
- July 2020
- Jan 2020 – Exercises of Computer Science, 1st year of the Bachelor Degree in Engineering in Industrial Design and Product Development at Universidad Politécnica de Madrid, *28 hours*
- July 2020
- Jan 2020 – Theory and exercises of Numerical Methods, 1st year of the Double Bachelor Degree in Mechanical Engineering and Engineering in Industrial Design and Product Development at Universidad Politécnica de Madrid, *42 hours*
- July 2020
- Jan 2019 – Theory and exercises of Complements of Mathematics, 1st year of the Bachelor Degree in Electrical Engineering at Universidad Politécnica de Madrid, *35 hours*
- July 2019
- Jan 2019 – Exercises of Computer Science, 1st year of the Bachelor Degree in Engineering in Industrial Design and Product Development at Universidad Politécnica de Madrid, *28 hours*
- July 2019
- Jan 2019 – Theory and exercises of Numerical Methods, 1st year of the Bachelor Degree in Chemical Engineering at Universidad Politécnica de Madrid, *42 hours*
- July 2019
- Nov 2018 Theory class of Advanced numerical methods and differential equations, Master degree in Production Engineering, Universidad Politécnica de Madrid, *2 hours*
- January 2018 Theory and exercises of Mathematics II (Ordinary differential equations), 1st year of the Bachelor degree in Chemical Engineering at Universidad Autónoma de Madrid, *(60 hours)*
- June 2018
- February 2017 Theory and exercises of Mathematics II (Ordinary differential equations), 1st year of the Bachelor degree in Chemical Engineering at Universidad Autónoma de Madrid, *(60 hours)*
- June 2017
- Sept 2016 – Theory and Exercises of Linear Algebra, 1st year of the Bachelor degree in Mathematics, Computer Science and Economics at Université Paris Dauphine, *(72 hours)*
- January 2017

- February– May 2014 Exercises of Classical Theory of Partial Differential Equations in the 3rd year of the double Bachelor degree in Mathematics and Physics at Universidad Complutense de Madrid, (26 hours)
- December 2012 Exercises of Classical Theory of Partial Differential Equations in the 4th year of the Bachelor degree in Mathematics at Universidad Complutense de Madrid, (3 hours)
- December 2012 Exercises of Ordinary Differential Equations in the 3rd year of the Bachelor degree in Mathematics at Universidad Complutense de Madrid, (4 hours)

Advisor activity

Bachelor degree final projects

- Numerical simulations of patterns in chemical reactions (in Spanish, year 2019–2020). Student: Silvia Riera Villapún
- Multivariable numerical optimization methods with applications to the optimization of the geometry of a motorcycle (in Spanish, year 2019–2020). Student: Jorge García López-Varela

Master degree final projects

- The diffusive logistic equation: analysis and numerics (coadvised with Julián López-Gómez, to be presented in 2020). Student: Pablo Cubillos

Research initiation grants

- Collaboration grant of the Department of Applied Mathematics to Industrial Engineering, Universidad Politécnica de Madrid (200 hours, year 2019-2020). Student: Alejandro Navarro Muñoz

Organization of conferences and seminars

- Jan-May 2016 ReaDi seminar on PDEs, 15 sessions ([link](#))
- Feb-Apr 2016 CAMS student's seminar, 3 sessions
- Mar-June 2015 Seminar "Between discrete and continuous", Insitut des Systèmes Complexes Paris Île-de-France, 4 sessions, 5 speakers, ([link](#))
- Jan-May 2015 ReaDi seminar on PDEs, 9 sessions 11 speakers ([link](#))
- 19/06/13–20/06/13 Workshop on nonlinear Partial Differential Equations, *Universidad Complutense de Madrid (Spain)*
- 19/09/12–21/09/12 Workshop of Young Researchers in Mathematics, *Universidad Complutense de Madrid (Spain)*

Attended conferences and courses

- *Nonlinear Models in Partial Differential Equations*, Toledo (Spain), June 2011
- *Workshop of Young Researchers in Mathematics*, Universidad Complutense de Madrid (Spain), September 2012
- *Biological invasions and evolutionary biology, stochastic and deterministic models*, Lyon (France), March 2013
- *Partial Differential Equations and Geometric Measure Theory*, Cetraro (Cosenza, Italy), June 2014

- Workshop “Mathematical Models for Social Sciences”, University Paris 6, December 2014
- Workshop “Mathematics and Social Sciences”, Imperial College, London, November 2015

— Languages

Italian	Mothertongue	
English	Proficiency	
Spanish	Proficiency	<i>Certificate DELE, Instituto Cervantes, C2 level</i>
French	Advanced	<i>Certificate DALF, C1 level</i>
German	Intermediate	<i>Zertifikat Deutsch, Goethe institute, B1 level</i>

— Computer skills

Mathematical Softwares	Matlab (advanced), Mathematica (advanced), Geogebra (intermediate), Maple (basic), FreeFem++ (basic)
Programming languages	C and C++ (advanced), Fortran and R (basic)
Text editors	\LaTeX (advanced)
Others	European Computer Driving Licence