

Ángel Arroyo

January 2022

Departamento de Análisis Matemático y Matemática Aplicada
Universidad Complutense de Madrid, Spain.
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Research Interests

Geometric function theory, nonlinear analysis, partial differential equations, p -Laplacian, p -harmonic functions, mean value properties, nonlocal operators, stochastic differential games.

Research Experience

- **Dpto. de Análisis Matemático y Matemática Aplicada** **Universidad Complutense de Madrid, Spain**
Assistant Professor *Jul. 2021 – Currently*
 - **Departamento de Matemáticas** **Universidad Carlos III de Madrid, Spain**
Assistant Professor *Sep. 2020 – Jun. 2021*
 - **Dipartimento di Matematica** **Università degli Studi di Genova, Italy**
Postdoctoral Researcher *Sep. 2019 – Sep. 2020*
 - **Department of Mathematics and Statistics** **Jyväskylän Yliopisto, Finland**
Postdoctoral Researcher *Sep. 2017 – Aug. 2019*
 - **Departament de Matemàtiques** **Universitat Autònoma de Barcelona, Spain**
PhD Student Researcher *Nov. 2013 – Aug. 2017*
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Publications & preprints

- **Local regularity estimates for general discrete dynamic programming equations** (with P. Blanc and M. Parviainen).
– Preprint.
- **Inverse problems on low-dimensional manifolds** (with G.S. Alberti and M. Santacesaria).
– Preprint: <https://arxiv.org/abs/2009.00574>.
- **Hölder regularity for stochastic processes with bounded and measurable increments** (with P. Blanc and M. Parviainen).
– To appear in *Ann. Inst. H. Poincaré Anal. Non Linéaire*.
– Preprint: <https://arxiv.org/abs/2109.01027>
– Impact factor (2020): 1,962.
- **p -harmonic functions by way of intrinsic mean value properties** (with J.G. Llorente).
– To appear in *Adv. Calc. Var.* (2021). DOI: <https://doi.org/10.1515/acv-2020-0101>
– Impact factor (2020): 2,537.
- **Asymptotic Hölder regularity for the ellipsoid process** (with M. Parviainen).
– *ESAIM Control Optim. Calc. Var.* **26** Paper No. 112, 31 pp (2020).
– Impact factor: 1,619.
- **Asymptotic Lipschitz regularity for tug-of-war games with varying probabilities** (with H. Luiro, M. Parviainen and E. Ruosteenoja).
– *Potential Anal.* **53** (2), pp. 565–589 (2020).
– Impact factor: 1,416.
- **On a class of singular measures satisfying a strong annular decay condition** (with J.G. Llorente).
– *Proc. Amer. Math. Soc.* **147** (10), pp. 4409–4423 (2019).
– Impact factor: 0,927.

- **A priori Hölder and Lipschitz regularity for generalized p -harmonious functions in metric measure spaces** (with J.G. Llorente).
 - *Nonlinear Anal.* **168**, pp. 32–49 (2018).
 - Impact factor: 1,450.
- **Tug-of-war games with varying probabilities and the normalized $p(x)$ -Laplacian** (with J. Heino and M. Parviainen).
 - *Commun. Pure Appl. Anal.* **16** (3), pp. 915–944 (2017).
 - Impact factor: 0,884.
- **On the asymptotic mean value property for planar p -harmonic functions** (with J.G. Llorente).
 - *Proc. Amer. Math. Soc.* **144** (9), pp. 3859–3868 (2016).
 - Impact factor: 0,679.
- **On the Dirichlet Problem for solutions of a restricted nonlinear mean value property** (with J.G. Llorente).
 - *Differential Integral Equations* **29** (1-2), pp. 151–166 (2016).
 - Impact factor: 0,565.

Publications in congresses

- **Asymptotic regularity for a random walk over ellipsoids**
 - To appear in *Proceedings of the 12th ISAAC Congress. Research Perspectives. Birkhäuser.*

Teaching experience

- **Differential Equations** **Universidad Complutense de Madrid**
2021-22 (1st semester)
 - 3rd course of the Degree in Mathematics
- **Numerical Methods** **Universidad Complutense de Madrid**
2021-22 (1st semester)
 - 2nd course of the Degree in Mathematics
- **Calculus II** **Universidad Carlos III de Madrid**
Curso 2020-21 (2^o semestre)
 - 1st course of the Degree in Aerospace Engineering (2 groups)
 - 1st course of the Degree in Mechanical Engineering
 - 1st course of the Degree in Industrial Electronics and Automation Engineering
- **Linear Algebra** **Universidad Carlos III de Madrid**
2020-21 (1st semester)
 - 1st course of the Degree in Sound and Image Engineering
- **Partial Differential Equations 2** **University of Jyväskylä**
2018-19
 - Master course
- **Functions of Real Variable** **Universitat Autònoma de Barcelona**
2015-16 (2nd semester)
2016-17 (2nd semester)
 - 1st course of the Degree in Mathematics

Education

- **Universitat Autònoma de Barcelona** **Bellaterra, Barcelona, Spain**
Nov. 2013 – May 2017
 - Doctor in Mathematics*
 - Advisor: José G. Llorente.
 - Thesis: ‘Nonlinear Mean Value Properties related to the p -Laplacian’.
 - PhD special Prize award.
- **Universidad de Murcia** **Murcia, Spain**
Sept. 2009 – Sept. 2010
 - Master in Advanced Mathematics, Faculty of Mathematics*
 - Master thesis: ‘Sucesiones en las Topologías Débiles de los Espacios de Banach’.
- **Universitat d’Alacant** **Alicante, Spain**
Sept. 2004 – June 2009
 - Degree in Mathematics, Faculty of Sciences*

Stays in other centers

- **Department of Mathematics, Uppsala Universitet**
2 months
Uppsala, Sweden
26/09/2016 – 25/11/2016
 - **Department of Mathematics and Statistics, Jyväskylän Yliopisto**
3 months
Jyväskylä, Finland
16/09/2015 – 18/12/2015
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Congresses

- **Congreso Bienal de la RSME 2022**
Talk: *Elliptic PDE's, Stochastic Processes and Dynamic Programming Equations*
Ciudad Real, Spain
January 18, 2022
 - **V Congreso de Jóvenes Investigadores de la RSME**
Talk: *Asymptotic regularity for a mean value property over ellipsoids*
Castellón de la Plana, Spain
January 27, 2020
Talk: *Approximation of p -harmonic functions by solutions of a restricted mean value property*
January 28, 2020
 - **12th ISAAC Congress**
Talk: *Asymptotic regularity for a random walk over ellipsoids*
Aveiro, Portugal
July 30, 2019
 - **Barcelona Analysis Conference 2019**
Talk: *Asymptotic regularity for a random walk over ellipsoids*
Barcelona, Spain
June 25, 2019
 - **Nonlinear Averaging and PDEs**
Talk: *Regularity for solutions of restricted mean value properties*
Levico Terme, Italy
June 19, 2019
 - **Barcelona Analysis Conference 2016**
Talk: *On the asymptotic mean value property for p -harmonic functions in the plane*
Barcelona, Spain
September 8, 2016
 - **Workshop on Complex Analysis and Operator Theory**
Talk: *On a mean value property related to the p -laplacian and p -harmonious functions*
Málaga, Spain
June 23, 2016
 - **II BGSMath Junior Meeting (BGSJ)**
Talk: *Mean value properties for p -harmonic functions*
Barcelona, Spain
May 13, 2016
 - **III Congreso de Jóvenes Investigadores de la RSME**
Talk: *On a nonlinear mean value property related to the p -laplacian*
Murcia, Spain
September 10, 2015
 - **Encuentros de Análisis Real y Complejo (EARCO XVI)**
Talk: *On a nonlinear mean value property related to the p -laplacian*
Carmona, Spain
May 23, 2015
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Talks in seminars

- **Seminar on Stochastics and PDEs**
Talk: *On the mean value property for p -harmonic functions*
University of Jyväskylä, Finland
18 de septiembre de 2015
- **Geometrisen analyysin seminaari**
Talk: *On the mean value property for p -harmonic functions*
University of Helsinki, Finland
3 de noviembre de 2015
- **Seminar in Analysis and Probability**
Talk: *On the mean value property for p -harmonic functions*
University of Uppsala, Sweden
22 de noviembre de 2016
- **Seminari d'Anàlisi de Barcelona**
Talk: *Mean value properties in metric measure spaces*
Universitat Autònoma de Barcelona, Spain
8 de mayo de 2017
- **Analysis seminar**
Talk: *Mean value properties in metric measure spaces*
University of Jyväskylä, Finland
11 de octubre de 2017
- **Seminar on Stochastics and PDEs**
Talk: *Regularity for Tug-of-War Games with Varying Probabilities (I–IV)*
University of Jyväskylä, Finland
del 29 de enero al 19 de febrero de 2018
- **Seminar on Stochastics and PDEs**
Talk: *Alexandrov-Bakelman-Pucci type estimates (I & II)*
University of Jyväskylä, Finland
2 and 16 de octubre de 2018

- **Seminari d'Anàlisi de Barcelona**
Talk: *Asymptotic regularity for mean value properties*
Universitat Autònoma de Barcelona, Spain
20 de enero de 2020
 - **MaLGA Seminar Series - Analysis and Learning**
Talk: *Nonlinear Mean Value Properties and PDE's*
Università degli Studi di Genova, Italy
9 de junio de 2020
 - **Seminario de Matemática Aplicada**
Talk: *Regularity estimates for dynamic programming equations*
Universidad Complutense de Madrid, Spain
3 de noviembre de 2021
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Grants and Scholarships

- **PhD Student's and Research Grant (FPI)**
Ministry of Economy, Industry and Competitiveness
Universitat Autònoma de Barcelona, Spain
2013 – 2017
 - **Grant for master studies**
University of Murcia
Universidad de Murcia, Spain
2009 – 2010
 - **Collaboration Grant**
Ministry of Education
Departamento de Análisis Matemático, Universitat d'Alacant, Spain
2008 – 2009
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Languages

- **English:** *fluent.*
 - **Spanish:** *native.*
 - **Catalan:** *fluent.*
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