

Personal Information

- **First name:** Rafael
- **Last name:** Granero Belinchón
- **Birth date:** 22 August 1986
- **Citizenship:** Spaniard
- **Address:** Departamento de Matemáticas, Estadística y Computación, Universidad de Cantabria (Spain)
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Current employment

Profesor Ayudante Doctor, *Departamento de Matemáticas, Estadística y Computación, Universidad de Cantabria.*

Previous employment

- 2016 - 2017 **Postdoctoral researcher *MILYon***, *Institut Camille Jordan, Université Claude Bernard Lyon 1.*
- 2013 - 2016 **'Arthur J. Krener' Assistant Professor**, *University of California, Davis (UC Davis), Davis.*
- 2009 - 2013 **FPI researcher**, *Institute of Mathematical Sciences (ICMAT-CSIC), Madrid.*

Education

- 2009 - 2013 **Ph.D. in Mathematics**, *Apto Cum Laude*, Advisors: Diego Córdoba Gazolaz and Rafael Orive Illera, *Instituto de Ciencias Matemáticas (CSIC).*
- 2008 - 2009 **M.Sc. in Partial Differential Equations-Random and Deterministic Modelling (Equations aux Dérivées Partielles -Modélisation Aléatoire et Déterministe)**, *Paris-Dauphine University (Paris IX), Paris.*
- 2008 - 2009 **M.Sc. in Mathematics and Applications**, *Autonomous University of Madrid (UAM), Madrid.*
- 2004 - 2008 **Bachelor in Mathematics (Licenciado en Matemáticas)**, *Autonomous University of Madrid, Madrid.*

Distinctions & Awards

- 06/2020 **'Antonio Valle' research award (Sociedad Española de Matemática Aplicada).**
- 01/2020 **Acreditación como Profesor Titular de Universidad**, *Agencia Nacional de Evaluación de la Calidad y Acreditación (ANECA).*
- 01/2018 **Awarded the Marie Skłodowska-Curie Actions Seal of Excellence for 'a high quality project proposal'**, *European Commission.*
- 02/2017 **Acreditación como Profesor Contratado Doctor (n. PCD 2017-2129)**, *Agencia Nacional de Evaluación de la Calidad y Acreditación (ANECA).*
- 02/2017 **Qualification a la fonction de maître de conférences (n. 17225302751D)**, *Conseil national des universités (CNU).*
- 03/2016 **Shanks travel support (Shanks International Conference on Evolution Equations.)**, *Vanderbilt University.*
- 06/2015 **'Vicent Caselles' research award (Real Sociedad Matemática Española).**
- 04/2014 **AIMS travel award (10th AIMS Conference on Dynamical Systems and Differential Equations.)**, *NSF grant DMS-1407408..*

Scientific publications

- 1 'The confined Muskat problem: differences with the deep water regime', *Communications in Mathematical Sciences*, vol. 12, no. 3, pp.423-455, 2014 (with D.Córdoba and R.Orive) (IF(JCR 2014): 1.120, Mathematics, applied: 74/257 (Q2), arXiv:1209.1575 [math.AP])
- 2 'An approximative treatment of gravitational collapse', *Physica D: Nonlinear Phenomena*, vol. 262, pp.71-82, 2013 (with Y.Ascasibar and J.M. Moreno) (IF(JCR 2013): 1.829, Mathematics, applied: 21/251 (Q1), arXiv:1211.5392 [math.AP])
- 3 'Impact of the climatic change on animal diseases spread: the example of bluetongue in Spain.', *Revista Complutense de Ciencias Veterinarias*, **5**, num 1, pag 120-131, 2011 (with C. Cianci et al.)
- 4 'Local solvability and turning for the inhomogeneous Muskat problem', *Interfaces and Free Boundaries*, vol. 16, n.2, pp. 175-213, 2014 (with L.C. Berselli and D. Córdoba) (IF(JCR 2014): 0.650, Mathematics: 136/312 (Q2), arXiv:1311.2194 [math.AP])
- 5 'Global existence for the confined Muskat problem', *SIAM Journal on Mathematical analysis*, vol. 46, no.2, pp. 1651-1680, 2014 (IF(JCR 2014): 1.265, Mathematics, applied: 60/257 (Q1), arXiv:1303.1769 [math.AP])
- 6 'An aggregation equation with a nonlocal flux', *Nonlinear Analysis Series A: Theory, Methods & Applications*, vol. 108, pp. 260-274, 2014 (with R.Orive)(IF(JCR 2014): 1.327, Mathematics, applied: 53/257 (Q1), Mathematics: 26/312 (Q1), arXiv:1306.6197 [math.AP])
- 7 'On turning waves for the inhomogeneous Muskat problem: a computer-assisted proof', *Nonlinearity*, vol. 27, n. 6, pp. 1471-1498, 2014. (with J. Gómez-Serrano) (IF(JCR 2014): 1.208, Mathematics, applied: 66/257 (Q2), arXiv:1311.0430 [math.AP])
- 8 'On a nonlocal analog of the Kuramoto-Sivashinsky equation', *Nonlinearity* vol. 28, n. 4, pp. 1103-1133, 2015 (with J. K. Hunter) (IF(JCR 2015): 1.289, Mathematics, applied: 60/254 (Q1), arXiv:1408.2020 [math.AP])
- 9 'On the effect of boundaries in two phase porous flow', *Nonlinearity* vol. 28, n. 2, pp. 435-461, 2015 (with G. Navarro and A. Ortega) (IF(JCR 2015): 1.289, Mathematics, applied: 60/254 (Q1), arXiv:1408.4079 [math.AP])
- 10 'New insight into Wolbachia epidemiology: its varying incidence during the host life cycle can alter bacteria spread.', *Bulletin of Mathematical Biology*, vol. 76, n.10, pp. 2646-2663, 2014 (with P. Martínez-Rodríguez, F.Arroyo-Yebras and J.L. Bella)(IF(JCR 2014): 1.389, Biology: 42/85 (Q2), Mathematical & computational biology: 34/57 (Q3))
- 11 'Global existence for some transport equation with nonlocal velocity', *Advances in Mathematics*, vol. 269, pp 197-219, 2015 (with H. Bae) (IF(JCR 2015): 1.405, Mathematics: 23/312 (Q1), arXiv:1408.2768 [math.AP])
- 12 'On a generalized doubly parabolic Keller-Segel system in one spatial dimension', *Mathematical Methods and Models in the Applied Sciences* vol. 26, no. 1 pp. 111-160, 2016 (with J. Burczak) (IF(JCR 2016): 2.860, Mathematics, applied: 6/255 (Q1), arXiv:1407.2793 [math.AP])
- 13 'Boundedness of large-time solutions to a chemotaxis model with nonlocal and semilinear flux', *Topological Methods in Nonlinear Analysis*, vol. 47, n.1, pp 369-387, 2016 (with J. Burczak) (IF(JCR 2016): 0.667, Mathematics: 145/311 (Q2), arXiv:1409.8102 [math.AP])
- 14 'Well-posedness of the Muskat problem with H^2 initial data', *Advances in Mathematics*, vol. 286, pp 32-104, 2016 (with A. Cheng and S. Shkoller) (IF(JCR 2016):1.373, Mathematics: 27/311 (Q1), arXiv:1412.7737 [math.AP])
- 15 'Critical Keller-Segel meets Burgers on S^1 : large-time smooth solutions', *Nonlinearity*, vol. 29, n. 12, 3810, 2016 (with J. Burczak) (IF(JCR 2016): 1.767, Mathematics, applied: 33/255 (Q1), arXiv:1504.00955 [math.AP])
- 16 'Global solutions for a supercritical drift-diffusion equation', *Advances in Mathematics*, vol. 295, pp. 334-367, 2016 (with J. Burczak) (IF(JCR 2016): 1.373, Mathematics: 27/311 (Q1), arXiv:1507.00694 [math.AP])

- 17 'On the generalized Buckley-Leverett equation', *Journal of Mathematical Physics*, vol. 57, 041501, 2016 (with J. Burczak and K. Luli) (IF(JCR 2016): 1.077, Physics, mathematical: 33/55 (Q3), arXiv:1509.07799 [math.AP])
- 18 'On a drift-diffusion system for semiconductor devices', *Annales Henri Poincaré*, vol. 17, n.12, pp 3473-3498, 2016 (IF(JCR 2016): 1.599, Physics, mathematical: 18/55 (Q2), arXiv:1603.03839 [math.AP])
- 19 'A model for Rayleigh-Taylor mixing and interface turn-over', *Multiscale Modeling and Simulation*, vol. 15, n. 1, pp 274-308, 2017 (with S. Shkoller) (IF(JCR 2017): 2.277, Mathematics, Interdisciplinary Applications: 25/103 (Q1), Physics, Mathematical: 9/55 (Q1), arXiv:1605.04259v4 [math.AP])
- 20 'On the fractional Fisher information with applications to a hyperbolic-parabolic system of chemotaxis', *Journal of Differential Equations*, vol. 262, n.4, pp. 3250-3283, 2017 (IF(JCR 2017): 1.782, Mathematics: 17/310 (Q1), arXiv:1607.06362v2 [math.AP])
- 21 'Global solutions for a hyperbolic-parabolic system of chemotaxis', *Journal of Mathematical Analysis and Applications*, vol. 449, pp. 872-883 (IF(JCR 2017): 1.138, Mathematics: 54/310 (Q1), arXiv:1607.06956 [math.AP])
- 22 'Global existence of weak solutions to dissipative transport equations with nonlocal velocity', *Nonlinearity*, vol. 31, n.4, pp. 1484-1515, 2018 (with H. Bae and O. Lazar) (IF(JCR 2017): 1.926, Mathematics, applied: 33/252 (Q1), arXiv:1609.04357 [math.AP])
- 23 'Suppression of blow up by a logistic source in 2D Keller-Segel system with fractional dissipation', *Journal of Differential Equations*, vol. 263, pp.6115-6142, 2017 (with J. Burczak) (IF(JCR 2017): 1.782, Mathematics: 17/310 (Q1), arXiv:1609.03935 [math.AP])
- 24 'Well-posedness and decay to equilibrium for the Muskat problem with discontinuous permeability', *Transaction of the American Mathematical Society*, vol. 372, n. 4, pp. 2255–2286, 2019 (with S. Shkoller) (IF(JCR 2017): 1.496, Mathematics 27/310 (Q1), arXiv:1611.06147 [math.AP])
- 25 'Boundedness and homogeneous asymptotics for a fractional logistic Keller-Segel equations', *Discrete and Continuous Dynamical Systems-S*, vol. 13, n. 2, pp. 139-164, 2019 (with J. Burczak) (IF(JCR 2017): 0.561, Mathematics, applied 219/252 (Q4), arXiv:1707.04527 [math.AP])
- 26 'On the thin film Muskat and the thin film Stokes equations', *Journal of Mathematical Fluid Mechanics*, vol. 21, n.2, pp. 33 (with G. Bruell) (arXiv:1802.05509 [math.AP])
- 27 'Global existence and decay to equilibrium for some crystal surface models', *Discrete and Continuous Dynamical Systems A*, vol. 39, n. 4, pp. 2101-2131, 2019 (with M. Magliocca) (IF(JCR 2017): 1.126, Mathematics 56/310 (Q1), arXiv:1804.09645 [math.AP])
- 28 'On the local and global existence of solutions to 1D transport equations with nonlocal velocity', *Networks and Heterogeneous Media*, vol. 14, n.3, pp. 471-487, 2019 (with H. Bae and O. Lazar) (arXiv:1806.01011 [math.AP])
- 29 'Rigorous Asymptotic Models of Water Waves', *Water Waves*, 1, pp. 71-130, 2019 (with A. Cheng, S. Shkoller and J. Wilkening) (arXiv:1807.00176 [math.AP])
- 30 'Growth in the Muskat problem', *Mathematical Modelling of Natural Phenomena* Volume 15, 7, 2020, (with O. Lazar) (arXiv:1904.00294 [math.AP])
- 31 'Asymptotic models for free boundary flow in porous media', *Physica D: Nonlinear phenomena* vol. 392, pp. 1-16, 2019, (with S. Scrobogna) (IF(JCR 2017): 1.960, Mathematics, applied 30/252 (Q1) arXiv:1807.00176 [math.AP])
- 32 'Models for damped water waves', *SIAM Journal on Applied Mathematics* vol.79, n.6, pp. 2530-2550, 2019 (with S. Scrobogna) (arXiv:1905.07751 [math.AP])
- 33 'On an asymptotic model for free boundary Darcy flow in porous media', *To appear in SIAM Journal on Mathematical Analysis* (with S. Scrobogna) (arXiv:1810.11798 [math.AP])
- 34 'On a nonlocal differential equation describing roots of polynomials under differentiation', *To appear in Communications in Mathematical Sciences* (arXiv:1812.00082 [math.AP])
- 35 'Well-posedness of a water wave model with viscous effects', *To appear in Proceedings of the American Mathematical Society* (with S. Scrobogna) (arXiv:1911.01912 [math.AP])
- 36 'On a thin film model with insoluble surfactant', *Journal of Differential Equations* vol. 268 n.12, 7582-7608, 2020, (with G. Bruell) (arXiv:1908.06406 [math.AP])

- 37 'Global existence and exponential decay to equilibrium for DLSS-type equations ', To appear in *Journal of Dynamics and Differential Equations*, (with H. Bae) (arXiv:1909.07684 [math.AP])
- 38 'Surface tension stabilization of the Rayleigh-Taylor instability for a fluid layer in a porous medium', To appear in *Annales de l'Institut Henri Poincaré / Analyse non lineaire*, (with F. Gancedo and S. Scrobogna) (arXiv:1911.03331 [math.AP])
- 39 'Singularity formation for the Serre-Green-Naghdi equations and applications to abcd-Boussinesq systems', Submitted, (with H. Bae) (arXiv:2001.11937 [math.AP])
- 40 'Well-posedness of the water-wave with viscosity problem', Submitted, (with S. Scrobogna) (arXiv:2003.11454 [math.AP])
- 41 'On the dynamics of 3D electrified falling films', Submitted, (with J. He) (arXiv:1906.12205 [math.AP])

Popular Science & Outreach

- 1 'El Problema de Basilea: historia y otras demostraciones', (Spanish) *La Gaceta de la RSME*, **12** (2009), 4, Pags. 721-737
- 2 'La ecuación de Burgers como un paso previo al estudio de los fluidos incompresibles', (Spanish) *La Gaceta de la RSME*, **15** (2012), 3, Pags. 489-512 (arXiv:1105.5990 [math.HO])
- 3 'Ondas no lineales en fluidos incompresibles', (Spanish) to appear in *La Gaceta de la RSME*
- 3 'Nicolás de Oresme y la serie armónica', *Boletín de la titulación de matemáticas de la UAL*, **2** (2008), 1, Pags. 12
- 4 'La Semana Multidisciplinar', *Encuentros Multidisciplinares*, **12** (2010), 35, Pags. 78-80 (with R. Orive)

Communications & seminars

Communications in Conferences

- 05/2011 Paseky school on Mathematical theory in fluid mechanics
- 09/2011 Congress of Young researchers RSME
- 10/2011 Mathematical weekend EMS-RSME
- 12/2012 International Winter School of Fluid Dynamics
- 10/2013 4th Annual Davis Math Conference
- 07/2014 10th AIMS Conference
- 10/2014 Fall Western Sectional Meeting
- 01/2015 GGAM Mini-Conference
- 04/2015 Spring Western Sectional Meeting
- 07/2015 Equadiff 2015
- 05/2016 Shanks conference
- 09/2016 Spanish-French Workshop on Analysis of PDEs from Fluid Mechanics
- 04/2017 III Conferencia de Matemáticos Ecuatorianos en París
- 06/2017 2017 Summer School and Workshop: Water Waves and Related Models
- 08/2017 Dispersive hydrodynamics and oceanography: from experiments to theory
- 09/2017 IV Congreso de Jóvenes Investigadores de la Real Sociedad Matemática Española
- 04/2018 IV Conferencia de Matemáticos Ecuatorianos en París
- 06/2018 Congreso 'Mathfluids' (IMUS, Sevilla)
- 07/2018 12th AIMS Conference (Taipei, Taiwan)
- 07/2018 UNIST workshop on PDE's in fluids (Ulsan, Korea)
- 09/2018 XIV-eme colloque franco-roumain de mathematiques appliquees (Bordeaux, France)
- 02/2019 Bilbao Workshop on Theoretical Fluid Dynamics (Bilbao, Spain)
- 05/2019 Modelling of nonlinear dispersive waves: Mathematical theory and numerical approximation (CIEM, Spain)
- 01/2020 V Congreso de Jóvenes Investigadores de la Real Sociedad Matemática Española

02/2020 III Mathematical Analysis Days BCAM-UR

Posters in Conferences

10/2011 Mathematical weekend (EMS-RSME)

11/2011 Third Congress of the Spanish Society for Evolutionary Biology

06/2013 Journées EDP (CNRS)

02/2017 Workshop on ideal fluids and transport (IMPAN)

Research Seminars

10/2009 Spanish National Research Council (CSIC), Madrid

04/2010 Autonomous University of Madrid (UAM), Madrid

06/2012 Università di Pisa, Pisa.

11/2012 Institute of Mathematical Sciences (ICMAT), Madrid.

03/2013 Universidad de Sevilla, Sevilla

01/2014 University of California at Davis, Davis.

04/2014 University of California at Berkeley, Berkeley.

10/2015 Princeton University, Princeton

02/2016 Rice University, Houston

03/2016 Center of Mathematical Research (CIMAT), Guanajuato

10/2016 Institut Camille Jordan, Lyon

12/2016 Laboratoire de Mathématiques et Modélisation d'Evry (LaMME), Evry

01/2017 University of Alberta, Edmonton

03/2017 King's College, London

04/2017 Ecole Normale Supérieure, Lyon

05/2017 Karlsruhe Institute of Technology, Karlsruhe

09/2017 Universidad Técnica de Ambato, Ambato

09/2017 Universidad San Francisco de Quito, Quito

07/2018 Ulsan National Institute of Science and Technology, Ulsan

10/2018 Basque Center for Applied Mathematics, Bilbao

11/2018 Instituto de Ciencias Matemáticas, Madrid

12/2019 Universidad del País Vasco, Bilbao

02/2020 Universidad de Valladolid

06/2020 Waves in one world (hosted by ICMS)

Popular Science & Outreach seminars

12/2010 '*Encuentros en la tercera (inter)fase*', seminar given in the colloquium organized by the student association *Siglo XXI* at Universidad Autónoma de Madrid

11/2011 '*¿En qué piensa un matemático cuando pasea por el río?*', seminar given at the Instituto de Ciencias Matemáticas.

10/2013 '*A(n applied) mathematician's apology*', seminar given in the colloquium organized by the student association *Math Club* at University of California.

11/2018 '*Matemáticas y fluidos: surfeando las olas desde el teorema*', seminar given during Science's week (Semana de la Ciencia) at Universidad de Cantabria.

Research stages (more than 1 month)

1/5/2012-31/7/2012 **Research stage at Applied Mathematics Department '*Ulisse Dini*' at Pisa University.**

16/5/2014-30/6/2014 **Research stage at Mathematical Institute at University of Oxford.**

Research projects

- 1 **PI of project PID2019-109348GA-I00: Mathematical Analysis of Fluids and Applications**, (MAFyA), Gobierno de España (MICIU).

Service

Organization of scientific events

Organizer of the '*1 Semana Multidisciplinar*' at the ICMAT.

Co-organizer of the '*Escuela JAE 2010*' at the ICMAT.

Member of the Organizing Committee of the conference '*Calculus of Variations, Singular Integrals and Incompressible Flows*' at the ICMAT.

Organizer of a Special Session on the conference '*12th AIMS Conference on Dynamical Systems and Differential Equations*' at NTU, Taipei, Taiwan.

Member of the Organizing Committee of the conference '*Jornadas Cantábricas de EDPs*' at the CIEM, Castro Urdiales.

Organizer of a Special Session on the conference '*Congreso Bienal de la Real Sociedad Matemática Española 2019*' at Universidad de Cantabria, Santander.

Member of the Organizing Committee of the conference '*Workshop PDE's in Fluid Mechanics*' at the CIEM, Castro Urdiales.

Referee

Discrete and Continuous Dynamical Systems

Nonlinear Analysis: Real World Applications

Pure and Applied Geophysics

Advances in Mathematical Physics

Philosophical Transactions A

Theoretical Population Biology

Nonlinearity

Boundary Value Problems

Journal of Elliptic and Parabolic Equations

Revista Matemática Complutense

SIAM Journal on Mathematical Analysis

Journal of Differential Equations

Physica D: Nonlinear Phenomena

Communications in Partial Differential Equations

SEMA Journal

Dynamics of Partial Differential Equations

Journal of Mathematical Physics

Journal of Mathematical Fluid Mechanics

Transactions of the American Mathematical Society

Topological Methods in Nonlinear Analysis

Kinetic and Related Models

Interfaces and Free Boundaries

Proceedings of the American Mathematical Society

Nonlinear Analysis

Nonlinear Differential Equations and Applications

Applied Mathematics Letters

Mathematical Methods in the Applied Sciences

Journal of Mathematical Analysis and Applications

Water Waves

SIAM Journal on Applied Mathematics

Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales. Serie A. Matemáticas

AIMS Mathematics

Applied Mathematics and Computation

International Mathematics Research Notices

Volunteering

- 1 Volunteer at International Congress of Mathematicians, Madrid, 2006
- 2 Volunteer at 'Math Cafe' (tutoring activity organized by the Women's resources and research center at University of California at Davis)

Teaching

At Universidad Autónoma de Madrid (UAM)

- Undergraduate course '*Cálculo I*' (first year calculus) on computing science,
- Undergraduate course '*Ecuaciones diferenciales y métodos numéricos*' (PDE's and numerical methods) on telecommunications engineering,
- Undergraduate course '*Cálculo numérico I*' (First year numerical analysis) on mathematics.

At University of California, Davis (UC Davis)

- Undergraduate course '*Short calculus*' MAT 016 A Sec.002,
- Undergraduate course '*Short calculus*' MAT 016 B Sec.005,
- Undergraduate course '*Calculus for BioSci*' MAT 017 B Sec.B01-B05.
- Undergraduate course '*Probability*' MAT 135 A Sec.001.
- Undergraduate course '*Differential equations*' MAT 022 B Sec.001.
- Undergraduate course '*Ordinary Differential Equations*' MAT 119 A Sec.001.
- Undergraduate course '*Ordinary Differential Equations*' MAT 119 B Sec.001.
- Undergraduate course '*Linear Algebra*' MAT 022A Sec.002
- Graduate course '*Nonlinear and nonlocal evolutionary PDE*' MAT 280 Sec.001

At Universidad de Cantabria (UNICAN)

- Undergraduate course '*Cálculo Integral*' (first year calculus) for the Mathematics degree,
- Undergraduate course '*Cálculo Integral*' (first year calculus) for the Physics degree,
- Undergraduate course '*Análisis Matemático y Métodos Numéricos*' (PDE's and numerical methods) for the Computing Science degree,
- Undergraduate course '*Aplicación de Cálculo Diferencial*' (second year calculus) for the Mathematics degree.
- Undergraduate course '*Métodos Matemáticos 2: EDPs*' (Partial Differential Equations) for the Physics degree.

At Université Claude Bernard Lyon 1

- Graduate course '*Free boundaries in certain incompressible flows*'