

## Diego Ribeiro Moreira

Ph.D in Mathematics.

Universidade Federal do Ceará (UFC).  
Departamento de Matemática.  
Bloco 914, Campus do Pici

### PERSONAL INFORMATION

### EDUCATION

- Ph.D. in Mathematics. August 2007  
University of Texas at Austin.  
Advisor: Prof. Luis A. Caffarelli.  
Thesis title: Least Supersolution Approach to Regularizing Elliptic Free Boundary Problems.
- Master of Science in Mathematics. August 2001.  
Universidade Federal do Ceará - Brazil.
- Bachelor Degree in Mathematics. (**Magna Cum Laude**). January 2000.  
Universidade Federal do Ceará - Brazil.

### RESEARCH INTERESTS

- Partial Differential Equations (Elliptic & Parabolic) and its Applications,
- Free Boundary Theory,
- (Free) Transmission Problems
- Geometric Measure Theory & Calculus of Variations,
- Harmonic Analysis and Potential Theory
- Fine Properties of Sobolev Functions and Maximal Operator Theory

### PROFESSIONAL EXPERIENCE

- Full Professor - Universidade Federal do Ceará (UFC) (February 2020)
- Associate Professor - Universidade Federal do Ceará (UFC) - Brazil (2014 - 2020)
- Assistant Professor - UFC - (2010 - 2013)
- Visiting Assisatnt Professor - University of Iowa - USA (2007 - 2010)

## AWARDS & HONORS

- Sabatical Position in University of São Paulo in São Carlos as a Full Professor (2024-2025)
- ICTP-INDAM Collaborative Grants and Research in Pairs (2024)
- Regular Associate Position - ICTP (2020-2025) - Trieste, Italy.
- CNPq Researcher (since 2011) (current level: 1C)
- Special Postdoctoral Position - IMPA (Brazil) - Spring (2010) (offer)
- Assistant Professor Position - University of North Carolina Greenboro - Spring 2010 (offer)
- Pacific Institute Mathematical Sciences (PIMS) - Postdoctoral Fellowship - Spring 2010 (offer)
- Professional Development Award - University of Texas at Austin - Summer 2007
- Hanno Rund Visiting Assistant Professor Position - University of Arizona - Spring 2007 (offer)
- A. D. Hutchison Student Endowment Fellowship - Fall 2006, Spring 2007.
- Magna Cum Laude Diploma - Universidade Federal do Ceará - Brazil - 2000.
- Universidade Federal do Ceará Honors Certificate - State Mathematical Olympiad - 1994.

## SELECTED INTERNATIONAL CONFERENCE & INTERNATIONAL VISITS (as a speaker)

- Summer Meeting ICMC - University of São Paulo at São Carlos - Brazil - February 2025
- Universidade Federal de São Carlos (UFSCAR) - PDE Workshop 2024 - Conference in honor to Prof. Olympio Miyagaki - Brazil - November 2024
- Latinos on Free Boundaries in Bologna - University of Bologna - Bologna - Italy July 2024
- Joint Meeting AMS - UMI - Palermo - Italy - July 2024
- Mostly Maximum Principle (5th edition) - Rio de Janeiro - June 2024
- ICTP - April 2024
- ICTP - April/May 2023
- Institute Mittag Leffler - IML - Geometric Aspects of Nonlinear PDEs - November 2022
- KTH (Sweden) - June 2022
- University of Bologna (Italy) - June 2022
- Mostly Maximum Principle, Cortona, Italy, June 2022
- ICTP (Trieste - Italy) - May/June 2022
- Instituto Superior Técnico (IST) - Lisbon - Portugal- April 2022.
- University of Coimbra - Coimbra - Portugal - April 2022.
- First Joint Meeting Brazil-France in Mathematics, July 2019, IMPA, Rio de Janeiro, Brazil
- ICM Satellite Conference on Nonlinear PDEs, ICM Brazil, July 2018, Fortaleza, Brazil.
- International Workshop on Nonlinear Dynamical Systems and Functional Analysis, ICM Satellite Conference, August 2018, Brasília, Brazil.
- V International Symposium on Nonlinear PDEs and Free Boundary Problems (Conference in Honor to Prof. Noemi Wolanski), December 2017, Universidade de Buenos Aires (UBA), Buenos Aires, Argentina.
- Mostly Maximum Principle, Banff International Research Station, April 2017, Banff, Alberta, Canada.
- University of Texas at Austin, April 2017, Austin, Texas, USA,
- First Joint Meeting Brazil-Italy in Mathematics, Sept 2016, IMPA, Rio de Janeiro, Brazil.
- Nonlinear PDEs @ IMPA, IMPA, Rio de Janeiro, Brazil (August 2010 and June 2016)
- University of Iowa, Iowa City, USA (4 times, November of 2013, 2014, 2017, 2018)

## ORGANIZED INTERNATIONAL CONFERENCES & COMMITTEES

- 1st Joint Meeting Brazil-Mexico, Fortaleza, Brazil, 2025.
- Chebyshev Grant subcommittee for Latin America and Caribbean (ICM - 2022 - Russia)
- Thematic Program - Current Trends in Analysis and PDEs - IMPA, Rio de Janeiro, 2015.
- Luis Caffarelli School of High Studies (CAPES), IMPA, Rio de Janeiro, Brazil, 2015.
- PDE Session of Colóquio Brasileiro de Matemática, IMPA, Rio de Janeiro, Brazil, 2015.
- 1st Joint Meeting Brazil-Spain, Fortaleza, Brazil, 2015.
- SIAM Conference on Analysis of Partial Differential Equations, Miami, Florida, USA, 2009 (Together with Irene Gamba & Lihe Wang)

## FUNDING & GRANTS

- PPP FUNCAP Grant 2010 (2010-2013) (State Funding)
- Universal CNPq Grant 2011 (2011-2014) (National Funding)
- Universal CNPq Grant 2014 (2014-2017) (National Funding)
- PRONEX (FUNCAP) 2011, PRONEX (FUNCAP) 2015 (State Funding)
- CNPq Researcher grant (since 2011) (as a CNPq researcher)
- ICTP (2020-2025) (International Funding)
- INdAM & ICTP - Research in Pairs Grant 2024 (International Funding)
- CNPq Universal 2024 - 2027 (National Funding)
- CNPq FUNCAP 2024 - 2026 (State Funding)
- FAPESP 2024-2025 (Sabatical Position in University of São Paulo at São Carlos)

(CNPq (National), FUNCAP (State of Ceará), FAPESP (State of São Paulo) are Brazilian agencies to fund research)

## SUPERVISED STUDENTS

### Master Students

- Adenilson Arcanjo Junior - 2014;  
(Partnership with Ecole Polytechnique de Paris/Université de Paris XI, France)
- Itamar Sales de Oliveira Filho - July/2016;  
(Itamar is now a Research Fellow at the University of Birmingham in UK)
- Peron Marques Filho - February/2019
- Rodrigo Fidelis Maia - February/2020  
(Rodrigo is now a Ph.D. student in UFC, Fortaleza)
- Dimas Macedo de Albuquerque - June/2021)  
(Dimas is now a Ph.D. student in University of Wisconsin in Madison, USA)

### Ph.D. Students

- José Ederson Melo Braga - June 2014;  
Placement: Assistant Professor at UFC
- José Gleison Carneiro da Silva - February 2016;  
Placement: Assistant Professor at UFC at Russas
- Diego Eloi Misquita - July 2019;  
Placement: Assistant Professor - Instituto Federal do Ceará at Canindé

- Wesley Vieira Araújo - July 2022  
Placement: Assistant Professor - Instituto Federal do Piauí at Parnaíba
- Rodrigo Fidelis (Current Ph.D. Student)

### Postdocs

- José Ederson Melo Braga - 2014/2016;  
Placement: Assistant Professor at UFC
- Renan Dantas Medrado - 2017;  
Placement: Assistant Professor at Universidade Federal de Alagoas (UFAL)
- Harish Shrivastava - 2020/2021;  
Placement: Postdoc at TIRF Bangalore-India

## TEACHING EXPERIENCE

### UFC (as primary instructor)

Courses Taught: Advanced Topics in Elliptic PDEs (Graduate Level), Introduction to PDE (Graduate Level), Fourier Analysis (Undergraduate Level), Real Analysis (Graduate Level); Calculus I (for Chemistry/ Undergraduate Level); Introduction to PDEs (Undergraduate Level); Elliptic PDEs (Graduate Level); Harmonic Analysis (Graduate Level); Linear Algebra & Analytic Geometry (Engineering/Undergraduate Level); Topology and Metric Spaces (Undergraduate Level); Topology of Manifolds (Undergraduate Level), Combinatorics (Undergraduate level).

### University of Iowa (as primary instructor)

Courses Taught: Vector Calculus (Undergraduate Level), Topics in Free Boundary Problems and Elliptic PDEs (Graduate Level), Fully Nonlinear PDEs (Graduate Level); Calculus I and II (Undergraduate Level), ODEs (Undergraduate Level)

### University of Texas at Austin (as teaching assistant)

Calculus II, Real Analysis, Linear Algebra and Matrix Computations, Partial Differential Equations II (Graduate Level), Methods of Applied Mathematics (graduate Level), Ordinary Differential Equations

### Reviewer

Advances in Mathematics, Archive for Rational Mechanics and Analysis (ARMA), Journal de Mathématique Pure et Appliquée (JMPA), Communications in Analysis and Geometry (CAG), Calculus of Variations and PDEs, Communications in Contemporary Mathematics, Annales de l'Institut Henri Poincaré C - Analyse Non Linéaire, Nonlinear Differential Equations (NoDEA), Duke Mathematical Journal, Annales Academiae Scientiarum Fennicae Mathematica, Revista Matemática Iberoamericana, Analysis & PDEs, Mathematische Annalen, Journal of Functional Analysis (JFA)

## SERVICE

- Department of Mathematics UFC Undergraduate Coordinator (2013-2015);
- Department of Mathematics UFC Representative in the College of Sciences (2015 - 2017);
- Scientific Coordinator of the Graduate Program in Mathematics UFC (2015-2017);
- Member of UFC Faculty Senate (2016-2018);
- Head of the Curriculum Reformation Board for Mathematics Program at UFC (2013-2019)
- Member of the Evaluation Committee for REU in Mathematics & Statistics UFC (since 2015)

- Member of the National Evaluation Board from CAPES (2017), (2021)
- Consulting for CNPq, CAPES, FUNCAP (Brazilian Funding Agencies for Science) since 2012
- Graduate Committee (Qualify Exams) since 2011

## PUBLICATIONS

1. *Weak convergence under nonlinearities.* (with E. Teixeira (UCF)). Annals of the Brazilian Academy of Sciences. (2003) 75(1) 9–19.
2. *On the behavior of weak convergence under nonlinearities and applications.* (with E. Teixeira (UCF)). Proceedings of the American Mathematical Society. 133 (2005), 1647-1656.
3. *A Singular perturbation free boundary problem for elliptic equations in divergence form* (with E. Teixeira (UCF)). Calc. Var. Partial Differential Equations 29 (2007) 161-190.
4. *Least supersolution approach to regularizing free boundary problems.* Arch. Ration. Mech. Anal. 191 (2009), no. 1, 97–141.
5. *On the Regularity of Maximal Operators,* Proc. Amer. Math. Soc. 136 (2008), no. 12, 4395–4404 (with E. Carneiro (ICTP)).
6. *Hausdorff measure estimates and Lipschitz regularity in inhomogeneous nonlinear free boundary problems.* Arch. Ration. Mech. Anal. 213 (2014), no. 2, 527–559. (with Lihe Wang (University of Iowa)).
7. *Singular perturbation method for inhomogeneous nonlinear free boundary problems.* Calc. Var. Partial Differential Equations 49 (2014), no. 3-4, 1237–1261. (with Lihe Wang (University of Iowa)).
8. *Uniform Lipschitz regularity for classes of minimizers in two phase free boundary problems in Orlicz spaces with small density on the negative phase.* Ann. Inst. H. Poincaré Anal. Non Linéaire 31 (2014), no. 4, 823-850. (with J.E. Braga (UFC))
9. *Differentiability at lateral boundary for fully nonlinear parabolic equations.* J. Differential Equations 263 (2017), no. 5, 2672-2686 (with Lihe Wang (UI) and Feyao Ma (Ningbo University (China))).
10. *Zero Lebesgue measure sets as removable sets for degenerate fully nonlinear elliptic PDEs.* NoDEA Nonlinear Differential Equations Appl. 25 (2018), no. 2, Art. 11, 12 pp. (with J.E. Braga (UFC))
11. *Inhomogeneous Hopf-Oleinik lemma and regularity of semiconvex supersolutions via new barriers for the Pucci extremal operators.* Adv. Math. 334 (2018), 184-242. (with J.E. Braga (UFC))
12. *Optimal regularity for the convex envelope and semiconvex functions related to supersolutions of fully nonlinear elliptic equations.* Comm. Math. Phys. 367 (2019), no. 1, 1-32. (with Alessio Figalli (ETH-Zurich) and J.E. Braga (UFC))
13. *Krylov's boundary gradient type estimates for solutions to fully nonlinear differential inequalities with quadratic growth on the gradient.* SIAM J. Math. Anal. 52 (2020), no. 5, 4469-4505. (with with J.E. Braga (UFC), D. Eloi and L. Wang (University of Iowa))
14. *Classification of nonnegative  $g$ -harmonic functions in half-spaces.* Potential Anal. 55 (2021), no. 3, 369-387. (with J.E. Braga (UFC))
15. *Up to the boundary gradient estimates for viscosity solutions to nonlinear free boundary problems with unbounded measurable ingredients.* Calc. Var. Partial Differential Equations 61 (2022), no. 5, Paper No. 197, 65 pp.
16. *Optimal regularity for variational solutions of free transmission problems* J. Math. Pures Appl. (9) 169 (2023), 1749. (with Harish Shrivastava) (TIRF-INDIA)
17. *Uniform Lipschitz Estimates up to the boundary for singular perturbation problem for some nonlinear elliptic PDEs with unbounded ingredients* Nonlinear Anal. 232 (2023), Paper No. 113-283, 19 pp. (with J. Ederson Braga (UFC)) and J. Gleison. Carneiro (UFC-Russas)

18. *An Inhomogeneous Version of the Carleson Estimate for Singular/Degenerate Nonlinear Equations*, Ann. Mat. Pura Appl. (4) 202, No. 5, 2293-2311 (2023). (With J. Ederson Braga (UFC), J. Walisson V. de Souza (UFC))
19. *Tangential contact between free and fixed boundaries for variational solutions to variable coefficients Bernoulli type free boundary problems* Interfaces Free Bound. 26, No. 2, 217-243 (2024). (joint with Harish Shrivastava) (TIRF-INDIA)
20. *A quantitative version of the Hopf-Oleinik lemma for a quasilinear non-uniformly elliptic operator*. Annales Fennici Mathematici, 49(1), 337-348 (2024) (joint with Segio Monari (USP-SC) and Jefferson Santos (UFCG))
21. *Tangential contact of free boundaries and the fixed boundary for variational solutions to free transmission problems* (submitted) (joint with Harish Shrivastava)
22. *Flipping one sided regularity via a Harnack approach and applications nonlinear elliptic problems* (submitted) (joint work with Edgard Pimentel (University of Coimbra - Portugal))
23. *Optimal regularity theory for weak solutions of free transmission problems in the context of quasilinear type via Leray-Lions Method* (submitted) (joint work with Harish Shrivastava (TIFR (India))).
24. *A quantitative version of the Hopf-Oleinik lemma for a quasilinear non-uniformly elliptic operator*. Ann. Fenn. Math. 49 (2024), no. 1, 337-348. (joint work with Segio Monari (USP-SC) and Jefferson Santos (UFCG))
25. *Liouville theorem for a quasilinear non-uniformly elliptic equation in half-spaces and applications* (joint work with Segio Monari (USP-SC) and Jefferson Santos (UFCG)) (To appear Annali di Pisa)
26. *Flipping one sided regularity via a Harnack approach* (submitted)

