Guillermo Reyes

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RESEARCH INTERESTS

Nonlinear elliptic and parabolic PDEs. Initial and boundary value problems for degenerate and singular diffusion equations. Long time self-similar asymptotics and qualitative behavior of solutions. Linear and nonlinear semigroups of operators. Mathematical Physics: Variational principles in Mechanics and Electromagnetic Theory. Data Science and Machine Learning.

EDUCATION

1999 **PhD** *summa cum laude* **in Mathematics** Autonomous University of Madrid, Spain.
PhD Thesis "Asymptotic behavior of solutions to nonlinear diffusion - convection equations".
Advisor: Prof. Juan Luis Vázquez.

1992 **Master of Science** *red diploma* **in Mechanics and Applied Mathematics**.
Lomonosov Moscow State University, Russia.
MS Thesis "Numerical methods in ideal plasticity theory". Advisor: Prof. J. A. Kamenjarzh.

ACADEMIC POSITIONS

2014 - present **Lecturer**. Math Department, University of Southern California, CA.

2012 - 2014 **Researcher**. Math Department, University of California at Irvine, CA.

2010 - 2011 **Visiting Professor**. Math Department, University of Memphis, TN.

2006 - 2012 **Associate Professor** (tenured). Math Department, School of Civil Engineering, Polytechnic University of Madrid, Spain.

2000 - 2006 **Assistant Professor**. Math Department, University Carlos III of Madrid, Spain.

1999 - 2000 **Research Postdoctoral Fellow - Marie Curie Fellowship**. Math Department, University of Rome La Sapienza, Italy.

1998 - 1999 **Assistant Professor**. Math Department, Autonomous University of Madrid, Spain.

TEACHING EXPERIENCE

Fall 2016 Math 226 - Calculus III and Math 125 - Calculus I, USC.

Summer 2016 Math 655 - Topics in PDEs: Partial Differential Equations of Mathematical Physics. An introduction (graduate course), USC.

Spring 2016 Math 226 - Calculus III and Math 499 - Special topics: Mathematics of Machine Learning, USC.

Fall 2015 Math 125 - Calculus I and Math 245 - Mathematics of Physics and Engineering I, USC.

Summer 2015 Math 245 - Mathematics of Physics and Engineering I and Math 655 - Topics in PDEs: Hamilton - Jacobi Equations: theory and applications (graduate course), USC.

Spring 2015 Math 125 - Calculus I and Math 114 - Foundation of Statistics, USC.

Fall 2014 Math 125 - Calculus I and Math 407 - Probability Theory, USC.

Summer 2013 Math 2J - Infinite Series and Linear Algebra. University of California, Irvine.

Fall 2011 Math 1830 - Elementary Calculus and Math 2702 - Introduction to Proofs/Fundamentals of Mathematics. University of Memphis.

2006 - 2012 Tensor Algebra and Analysis, Calculus and Ordinary Differential Equations, School of Civil Engineering, Polytechnic University of Madrid, Spain.

2000 - 2006 Calculus in one and several variables, Ordinary Differential Equations, Linear Algebra and Complex Analysis. Polytechnic School, University Carlos III of Madrid, Spain.

GRANTS AND PROJECTS

2012 - 2014 Member of the FY'12 Air Force AFOSR MURI Project "Innovative use of Meta-materials in Confining, Controlling, and Radiating Intense Microwave Pulses". University of California, Irvine.

2011 Grant from Fundación Caja Madrid for Spanish distinguished researchers. 7 months stay at the University of Memphis, TN.

2002 - 2014 Member of several Spanish National Research Projects. Financing institution: Ministry of Science and Technology, Spain.

1997 - 2002 European Project T.M.R. ERBFMRX-CT98-0201 "Nonlinear Parabolic Partial Differential Equations. Methods and Applications".

1993 - 1998 Grants from the Institute of Hispano-American Cooperation and the Spanish Ministry of Science and Technology for PhD studies.

ACADEMIC VISITS

Aug. 2011 - Feb. 2012 Mathematics Department, University of Memphis, USA. Visiting Professor. Research topic: Abstract wave equations.

Aug.- Dec. 2010 Mathematics Department, University of Memphis, USA. Visiting Research Professor. Research topic: Abstract wave equations and equipartition of energy.

Aug. 2005 Mathematical Biosciences Institute, Ohio State University. Postdoctoral research visit. Research topic: Mathematical models of tumor growth.

March - June 2003 Mathematics Department, Sapienza-University of Rome, Italy. Postdoctoral research visit. Research topic: Reaction-diffusion semilinear problems.

1999 - 2000 Mathematics Department, Sapienza-University of Rome, Italy. Postdoctoral research visit. Research topic: absorption-diffusion equations in inhomogeneous media.

Apr.- May 1999 Mathematics Department, Sapienza-University of Rome, Italy. Postdoctoral research visit. Research topic: absorption-diffusion equations in inhomogeneous media.

Jan.- Apr. 1997 Mathematics Department, Université de Franche Comté, Besançon, France. Research topic: Nonlinear convection-diffusion equations.

RECENT INVITED LECTURES

2015 2015 AMS Southeastern Regional Conference, University of Memphis.

2014
Fall Colloquium Series, Cal Poly Pomona.
CAMS Colloquium, University of Southern California.
Equations and Nonlinear Analysis Workshop at CCMS, Harvey Mudd College.

2013
Mathematics Department seminar, Harvey Mudd College.

2012
Department Colloquium, Georgetown University.
Department Colloquium, Howard University.
Mathematics Department seminar, University of Mississippi.
PDEs seminar, University of California Irvine.

2010

Department Colloquium, Mississippi State University.
Department Colloquium, Louisiana State University.

PROFESSIONAL SERVICE

2015 Co-organizer of the AMS Session "Evolution Semigroups and PDE" to be held in Memphis, Oct. 2015.

2010 Design of the undergraduate Mathematics curriculum for Materials Science Engineering, School of Civil Engineering, Polytechnic University of Madrid, Spain.

2008 - 2011 Academic Assistant to the Chair. Mathematics Department, School of Civil Engineering, Polytechnic University of Madrid.

2008 Member of the Coordination Committee of the 49th International Mathematical Olympiad, Madrid.

2007 Organizing Committee of the Congress Nonlinear Diffusion: Mathematics and Applications, Madrid.

2007 - present Reviewer for the MathSciNet database.

PUBLICATIONS

1. G. Reyes, *Asymptotic behaviour of diffusion-convection processes*, Nonlinear Anal. **37** (1999), pp. 301-318.

2. G. Reyes & J. L. Vázquez, *Asymptotic behaviour for a generalized Burgers' Equation*, J. Math. Pures Appl. **78** (1999), pp. 633-666.

3. G. Reyes, *Critical asymptotic behaviour for a perturbed conservation law*, Asymptotic Analysis **25** (2001), pp. 109-122.

4. R. Kersner, G. Reyes & A. Tesei, *On a class of parabolic equations with variable density and absorption*, Adv. Differential Equations **7** (2) (2002), pp. 155-176.

5. G. Reyes & A. Tesei, *Basic theory for a diffusion-absorption equation in an inhomogeneous medium*, Nonlinear Differential Equations Appl. **10** (2) (2003), pp. 197-222.

6. G. Reyes & A. Sánchez, *Disappearance of interfaces for the porous medium equation with variable density and absorption*, Asymptotic Analysis **36** (2003), pp. 13-20.

7. A. de Pablo & G. Reyes, *Long time behaviour for a nonlinear first order equation*, Nonlinear Anal. TMA **65** (2) (2006), pp. 284-300.

8. R. Ferreira, A. de Pablo, G. Reyes & A. Sánchez, *The interfaces of an inhomogeneous porous medium equation with convection*, Comm. Partial Differential Equations **31** (2006), pp. 1-18.

9. L. Moschini, G. Reyes & A. Tesei, *Nonuniqueness of solutions to a semilinear parabolic equation with inverse-square potential*, Commun. Pure Appl. Anal. **5** (1) (2006), pp. 155-179.

10. G. Reyes & A. Tesei, *Self-Similar Solutions of a Semilinear Parabolic Equation with Inverse-Square Potential*, J. Differential Equations **219** (2005), pp. 40-77.

11. G. Reyes & J. L. Vázquez, *A weighted symmetrization for nonlinear elliptic and parabolic equations in inhomogeneous media*, J. Eur. Math. Soc. **8** (2006), pp. 531-554.

12. G. Reyes & J. L. Vázquez, *The Cauchy problem for the inhomogeneous porous medium equation*, Networks and Heterogeneous Media **1** (2) (2006), pp. 337-351.

13. G. Reyes & J. L. Vázquez, *Long time behaviour for the inhomogeneous PME in a medium with slowly decaying density*, Commun. Pure Appl. Anal. **8** (2) (2009), pp 493–508.

14. G. Reyes & J. L. Vázquez, *The inhomogeneous PME in several space dimensions. Existence and uniqueness of finite energy solutions*, Commun. Pure Appl. Anal. **7** (6) (2008), pp. 1275–1294.

15. A. de Pablo, G. Reyes & A. Sánchez, *Blow-up for a heat equation with convection and boundary flux*, Proc. Roy. Soc. Edinburgh Sect. A **138** (3) (2008), pp. 513–530.

16. A. Bouzelmate, A. Gmira & G. Reyes, *On the self-similar solutions for a nonlinear Ornstein-Uhlenbeck equation*, Electronic Journal of Differential Equations **67** (2007), pp. 1-21.

17. A. Bouzelmate, A. Gmira & G. Reyes, *On the radial solutions of a degenerate elliptic equation with convection term*, Int. J. Math. Anal. (Ruse) **1** (2007), no. 17-20, pp. 975–993.

18. S. Kamin, G. Reyes & J. L. Vázquez, *Long time behavior for the inhomogeneous PME in a medium with rapidly decaying density*, Discrete and Continuous Dynamical Systems, (special issue devoted to Nonlinear Parabolic Problems), DCDS-A **26** (2) (2010), pp. 521–549.

19. S. Elena Nieto & G. Reyes, *Asymptotic behavior of the solutions of the inhomogeneous Porous Medium Equation with critical vanishing density*, Commun. Pure Appl. Anal. **12** (2) (2013), pp. 1123–1139.

20. A. de Pablo, G. Reyes & A. Sánchez, *Blow-up for a nonhomogeneous heat equation with reaction*, DCDS-A **33** (2) (2013), pp. 643–662.

21. J.A. Goldstein & G. Reyes, *Equipartition of operator-weighted energies in damped wave equations*, Asymptotic Analysis **81** (2) (2013), pp. 171–187.

22. R. G. Iagar, G. Reyes & A. Sánchez, *Radial Equivalence of Nonhomogeneous Nonlinear Diffusion Equations*, Acta Applicandae Mathematicae **123** (1) (2013), pp. 53–72.

23. A. Figotin & G. Reyes, *Multi-transmission-line-beam interactive system.* Journal of Mathematical Physics **54**, 111901 (2013)

24. J.A. Goldstein, Gisèle Ruiz Goldstein & G. Reyes, *Overdamping and energy decay for abstract wave equations with strong damping*, Asymptot. Anal. **88** (4) (2014), pp 217–232.

25. A. Figotin & G. Reyes, *Lagrangian Variational Framework for Boundary Value Problems*, J. Math. Phys. **56**, 093506 (2015); http://dx.doi.org/10.1063/1.4931135

26. A. Castro & G. Reyes, *Existence of multiple solutions for a semilinear problem and a counterexample by E. N. Dancer*, submitted to Communications on Pure and Applied Analysis, 2016.

27. J.A. Goldstein & G. Reyes, *Equipartition of energy for an ill-posed system with cross fricton*, in preparation.