

Alejandro Sarria

CONTACT INFORMATION

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RESEARCH INTERESTS

Mathematical fluid dynamics (incompressible Euler equations), nonlinear partial differential equations, evolution equations.

APPOINTMENTS

Fall 2015 - Present

Visiting Assistant Professor, Department of Mathematics and Statistics, Williams College, Williamstown, MA.

Fall 2013 - Spring 2015

Burnett-Meyer Postdoctoral Fellow, Department of Mathematics, University of Colorado, Boulder, CO.

Fall 2012 - Spring 2013

Instructor, Department of Mathematics, Dillard University, New Orleans, LA.

PUBLICATIONS, PRE-PRINTS

1. *Remarks on infinite energy solutions of the n -dimensional Euler and MHD equations with time-dependent damping* (with J. Choi, N. Krishna, N. Magill and B. Mariscal), pre-print.
2. *On the L^p regularity of solutions to the generalized Hunter-Saxton system* (with J. Choi, N. Krishna, N. Magill and B. Mariscal), Submitted, arXiv:1609.03231.
3. *Damped infinite energy solutions of the 3D Euler and Boussinesq equations* (with W. Chen), Submitted, arXiv:1605.08965.
4. *Lagrangian aspects of the axisymmetric Euler equation* (with S.C. Preston), *Nonlinearity* 29 (2016), 1080-1095.
5. *A sign-changing Liouville equation* (with R. Saxton), *J Evol Equ* 15 (2015), 847-867.
6. *Blow-up in stagnation-point form solutions of the inviscid 2d Boussinesq equations* (with J. Wu), *J Differ Equations* 259 (2015), 3559-3576.
7. *Global estimates and blow-up criteria for the generalized Hunter-Saxton system*, *Discrete Cont Dyn-B* 20 (2) (2015), 641-673.

Alejandro Sarria

PUBLICATIONS, PRE-PRINTS CONTINUED...

8. *One-parameter solutions of the Euler-Arnold equation on the contactomorphism group* (with S.C. Preston), *Discrete Cont Dyn S* 35 (5) (2015), 2123-2130.
9. *The role of initial curvature in solutions to the generalized inviscid Proudman-Johnson equation* (with R. Saxton), *Q Appl Math* 73 (1) (2015), 55-91.
10. *Regularity of stagnation-point form solutions of the two-dimensional incompressible Euler equations*, *Differential and Integral Equations* 28 (3-4) (2015), 239-254.
11. *Critical buckling loads of the perfect Hollomon's power-law columns* (with D. Wei and M. Elgindi), *Mech Res Commun* 47 (2013), 69-76.
12. *Blow-up of solutions to the generalized inviscid Proudman-Johnson equation* (with R. Saxton), *J Math Fluid Mech* 15 (3) (2013), 493-523.

EDUCATION

University of New Orleans, New Orleans, LA.

Ph.D. Mathematics - Engineering and Applied Sciences, December 2012.

- Adviser: Professor Ralph Saxton.
- Supported by an Ernest G. Chachere doctoral fellowship, 2008-2012.

M.S. Mathematics, December 2009.

B.S. Mathematics, May 2008.

- *Magna cum Laude*, with honors in mathematics.

TEACHING EXPERIENCE

1. *Williams College*

- Spring 2017
 - Differential Equations.
 - Complex Analysis.
- Fall 2016
 - Chaos and Dynamical Systems.
 - Nonlinear Waves, Solitons.
- Spring 2016
 - Methods in Mathematical Fluid Dynamics.
- Fall 2015
 - Multivariable Calculus (three sections).

TEACHING
EXPERIENCE
CONTINUED...

2. *University of Colorado at Boulder*

- Spring 2015
 - Discrete Mathematics.
 - Ordinary Differential Equations.
- Fall 2014
 - Topics in Analysis: Sobolev spaces and global analysis (graduate course).
- Spring 2014
 - Analysis I.
 - Ordinary Differential Equations.
- Fall 2013
 - Linear Algebra.

3. *Dillard University*

- Spring 2013
 - Precalculus (two sections, course coordinator).
 - Analytic Geometry and Calculus III (course coordinator).
- Fall 2012
 - College Algebra.

4. *University of New Orleans*

- Fall 2012
 - Precalculus Algebra.

CONFERENCE,
SEMINAR TALKS

- **Department of Mathematics, Hunter College**, AMS Special Session on Euler and related PDEs: geometric and harmonic methods, NYC, NY, May 2017, TBA.
- **Department of Mathematics and Statistics, Williams College**, MathBlast, Williamstown, MA, March 2017, *The logic of logic circuits*.
- **Department of Mathematics and Statistics, Williams College**, Faculty Seminar, Williamstown, MA, December 2016, *On a proposed higher-dimensional analogue of the Camassa-Holm equation*.
- **Department of Mathematics and Statistics, Williams College**, SMALL REU Colloquium, Williamstown, MA, July 2016, *Suppression of singularities in fluids*.
- **Department of Mathematics and Statistics, Williams College**, Faculty Seminar, Williamstown, MA, October 2015, *The 3d axisymmetric Euler equations*.
- **Department of Mathematics, University of Colorado at Boulder**, Seminar on Analysis and Geometry, Boulder, CO, April 2015, *Local-in-space models for axisymmetric 3D Euler flow*.

Alejandro Sarria

CONFERENCE,
SEMINAR TALKS
CONTINUED...

- **Department of Mathematics, University of Colorado at Boulder**, Navier-Stokes/Euler Seminar Series, Boulder, CO, March-April 2015, *The Constantin-Fefferman-Majda regularity criterion for 3D Euler*.
- **Department of Mathematics, The University of Toledo**, Colloquium, Toledo, OH, February 2015, *A solvable 1D fluid model with singularities* (invited speaker).
- **Department of Mathematics, Carleton College**, Colloquium, Northfield, MN, February 2015, *How can water blowup, mathematically?* (invited speaker).
- **University of North Carolina at Greensboro**, Southeastern AMS Meeting, special session on PDE related to fluids, Greensboro, NC, November 2014, *Remarks on a local-in-space formulation of axisymmetric ideal fluids* (invited speaker).
- **NSF-CBMS Regional Conference in the Mathematical Sciences: Problems of PDEs Related to Fluids**, Oklahoma State University, Stillwater, OK, July 2014, *On a higher-dimensional analogue of the Camassa-Holm equation* (invited speaker).
- **Department of Mathematics, University of Colorado at Boulder**, Seminar on Analysis and Geometry, Boulder, CO, February 2014, *On the Constantin-Lax-Majda equation and other 1D models for 3D vorticity*.
- **SIAM Conference on Analysis of Partial Differential Equations** (session chair), Lake Buena Vista, FL, December 7-10 2013, *Breakdown of solutions to the generalized two-component Hunter-Saxton system*.
- **Department of Mathematics, University of Colorado at Boulder**, Seminar on Analysis and Geometry, Boulder, CO, September 2013, *A generalized sign-changing Liouville equation*.
- **Department of Mathematics, University of New Orleans**, Colloquium, New Orleans, LA, April 2013, *Global existence in the generalized Hunter-Saxton system*.
- **Department of Mathematics, University of Colorado at Boulder**, Kempner Colloquium, Boulder, CO, March 2013, *Regularity of solutions to a simple generalized model of fluid dynamics* (invited speaker).
- **Department of Mathematics, Centenary College of Louisiana**, Colloquium, Shreveport, LA, February 2013, *Exact solutions to a differential equation of fluid dynamics* (invited speaker).
- **University of West Florida, 2012 Florida Chapter Local MAA Meeting**, Pensacola, FL, November 16-17, 2012, *Blow-up of Special Solutions to 2D Euler: Periodic vs Dirichlet Boundary Conditions*.
- **Department of Mathematics, Loyola University**, Colloquium, New Orleans, LA, November 14, 2012, *Singularities in fluids* (invited speaker).
- **Department of Mathematics, Texas A&M University**, 35th annual Texas PDE conference, College Station, TX, March 3-4, 2012, *Blow-up of solutions to the generalized inviscid Proudman-Johnson equation*.

CONFERENCE,
WORKSHOP,
RESEARCH
PROGRAM
PARTICIPATION

- **Mathematical Research Communities**, *Regularity Problems for Nonlinear PDE Modeling Fluids and Complex Fluids*, organized by P. Constantin, G. Iyer, I. Kukavica, H. Lopes, and J. Wu, Snowbird, UT, USA, June-July 2013.
- **Centre de Recherches Mathematiques**, *Workshop on Geometry and Dynamics of Fluid*, organized by S. Kuksin, S. C. Preston, and A. Shnirelman, Montreal, Canada, May 21-25, 2012.
- **Pennsylvania State University**, *Penn State-Göttingen Research Program*, organized by J. Gil, T. Krainer, V. Nistor, and I. Witt, State College, PA, USA, July-August, 2010.

Alejandro Sarria

FELLOWSHIPS, AWARDS

- Received funding from Division III & P Research Funding Committee at Williams College to hire a research assistant during the 2015-16 academic year.
- Supported by NSF grant DMS-1342592 to attend the NSF-CBMS Regional Conference: Regularity Problems for PDE Modeling Fluids and Geophysical Fluids, Oklahoma State University, Stillwater, OK, USA, July 2014.
- Supported by NSF grant DMS-1007980 to attend the Mathematical Research Communities Program, Snowbird, UT, USA, June-July 2013.
- Supported by NSF grant DMS-1157293 to attend the workshop on geometry and dynamics of fluid, centre de recherches mathematiques, Montreal, CA, May 2012.
- Supported by NSF grant DMS-0963728 to attend the Penn State-Göttingen research program on differential equations, PSU, State College, PA, USA, July 2010.
- Ernest G. Chachere doctoral fellowship and membership in the southern regional education board doctoral scholars program, 2008-2012.

MENTORING OF STUDENTS AT WILLIAMS COLLEGE

- SMALL REU, Williams College, Williamstown, MA, USA, June-August, 2016. Advised four students, leading to pre-prints [1] and [2].
- Co-authored pre-print [3] with a student.
- Advised the senior colloquium of five students.
- Second reader for one senior honors thesis.

SERVICE

- Faculty advisor for the newly-found chapter of the Society for Industrial and Applied Mathematics (SIAM) at Williams College.
- Assisting with the weekly student colloquium at Williams College.
- Member of the steering committee for the Hudson River Undergraduate Mathematics Conference at St. Michael's College, April 2016.
- Member of the oral examination committee for two graduate students at CU Boulder.
- Referee for *Mathematical Methods in the Applied Sciences*.

SEMINARS AND CONFERENCES ORGANIZED

- Navier-Stokes/Euler Seminar, Department of Mathematics, University of Colorado at Boulder, Boulder, CO, Fall 2014-Spring 2015.
- Seminar on Analysis and Geometry, Department of Mathematics, University of Colorado at Boulder, Boulder, CO, Fall 2013-Spring 2015.

ADDITIONAL INFORMATION

- Other Background: Mathematical modeling in continuum mechanics, finite element analysis, engineering analysis, acoustics.
- Technical Skills: MATHEMATICA, MAPLE, T_EX.
- Languages: English, Spanish (native).
- Other skills: Ultra-marathon runner.

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REFERENCES

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Editor-in-Chief

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