

Ryan Hynd

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EMPLOYMENT

- 07/2012 – present **Assistant Professor**, *Department of Mathematics*, University of Pennsylvania.
- 07/2016 – 06/2017 **MLK Visiting Professor**, *Department of Mathematics*, Massachusetts Institute of Technology.
- 07/2010 – 06/2012 **Postdoctoral Fellow**, *Courant Institute of Mathematical Sciences*, New York University.

EDUCATION

- 05/2010 **Ph.D. in Mathematics**, *University of California–Berkeley*.
- 07/2004 **M.Sc. in Applied Mathematics**, *Georgia Institute of Technology*.
- 12/2003 **B.S. in Applied Mathematics**, *Georgia Institute of Technology*.
- 05/2001 **Associates of Arts**, *Palm Beach Community College*.

RESEARCH FUNDING

National Science Foundation CAREER (DMS-1554130)
National Science Foundation mathematical sciences grant (DMS-1301628)
Simons Foundation Collaboration Grants for Mathematicians (MPS-283346)
National Science Foundation postdoctoral research fellowship (DMS-1004733)
National Science Foundation graduate research fellowship
Lucent Technologies/Bell Labs graduate research fellowship

PUBLICATIONS

Approximation of the least Rayleigh quotient for degree p homogeneous functionals, with Erik Lindgren, *Journal of Functional Analysis* 272 (2017) 4873–4918.

An eigenvalue problem for fully nonlinear elliptic equations with gradient constraints, *Calculus of Variations and Partial Differential Equations* 56 (2017), no. 2, 56:34.

Compactness methods for doubly nonlinear parabolic systems, *Transactions of the American Mathematical Society* 369 (2017), no. 7, 5031–5068. .

Hölder estimates and large time behaviour for a nonlocal doubly nonlinear evolution, with Erik Lindgren, *Analysis & PDE* 9 (2016), no. 6, 1447–1482

A doubly nonlinear evolution for the optimal Poincaré inequality, with Erik Lindgren, *Calc. Var. Partial Differential Equations* 55 (2016), no. 4, Paper No. 100, 22 pp.

Plateau's Rotating drops and rotational figures of equilibrium, with Jeffrey Elms, Roberto Lopez, and John McCuan, *J. Math. Anal. Appl.* 446 (2017) 201–232.

On Hamilton-Jacobi-Bellman equations with convex gradient constraints, with Henok Mawi, *Interfaces and Free Boundaries* 18 (2016), 291–315.

Inverse iteration for p -ground states, with Erik Lindgren, *Proceedings of the American Mathematical Society* 144 (2016), 2121–2131.

Value functions in the Wasserstein spaces: finite time horizons, with Hwa Kil Kim, *Journal of Functional Analysis* 269 (2015) 968–997.

Infinite horizon value functions in the Wasserstein spaces, with Hwa Kil Kim, *Journal of Differential Equations* 258 (2015) 1933–1966.

Option pricing in the large risk aversion, small transaction cost limit, *Communications in Partial Differential Equations*, Volume 39 Issue 11 (2014) 1998–2027.

Partial regularity of weak solutions of the viscoelastic Navier-Stokes equations with damping, *SIAM J. Math. Anal.* 45 (2013), no. 2, 495–517.

Nonuniqueness of infinity ground states, with Charles Smart and Yifeng Yu, *Calculus of Variations and Partial Differential Equations*, (2013) Volume 48, Issue 3–4, pp 545–554.

A blowup criterion for ideal viscoelastic flow, with Xianpeng Hu, *Journal of Mathematical Fluid Mechanics*, (2013), Volume 15, Issue 3, pp 431–437.

Analysis of Hamilton-Jacobi-Bellman equations arising in stochastic singular control, *ESAIM Control Optim. Calc. Var.* 19 (2013), no. 1, 112–128.

The eigenvalue problem of singular ergodic control, *Communications of Pure and Applied Mathematics* 65 (2012), no. 5, 649–682.

Symmetric constant mean curvature surfaces in \mathbb{S}^3 , with Sung Ho Park and John McCuan, *Pacific Journal of Mathematics* Volume 241 (2009), no. 1, 63–115.

Toroidal Rotating Drops, with John McCuan, Pacific Journal of Mathematics Volume 224 (2006), no. 2, 279-289.

SUBMITTED WORK

Partial regularity for type two doubly nonlinear parabolic systems, 43 pages, arxiv.org/abs/1704.05602.

Large time behavior of solutions of Trudinger's equation, with Erik Lindgren, 39 pages, arxiv.org/abs/1702.01630.

Partial regularity for doubly nonlinear parabolic systems of the first type, 36 pages, arxiv.org/abs/1702.00537.

Extremal functions for Morrey's inequality in convex domains, with Erik Lindgren, 24 pages, arxiv.org/abs/1609.08186.

INVITED TALKS

- 5/2017 *Some open questions with PDE arising in problems with transaction costs*. Mathematical Finance, Probability, and Partial Differential Equations Conference, Rutgers University
- 4/2017 *Extremal functions for Morrey's inequality in convex domains*. Nonlinear Analysis Seminar, Rutgers University
- 3/2017 *Partial regularity for type one doubly nonlinear parabolic systems*. Workshop on Partial Differential Equations and Applications, University of Pittsburgh
- 2/2017 *Large time behavior of solutions to Trudinger's equation*. PDE Seminar, University of Massachusetts Amherst
- 1/2017 *Extremal functions for Morrey's inequality in convex domains*. PDE Seminar, University of Kentucky
- 12/2016 *Large time behavior of solutions to Trudinger's equation*. PDE Seminar, University of Minnesota
- 11/2016 *Extremal functions for Morrey's inequality in convex domains*. PDE Seminar, Brown University
- 11/2016 *Infinity ground states*. Colloquium, Kansas University
- 10/2016 *Approximation of optimal constants and extremal functions for Poincaré's inequality*. Geometric Analysis Seminar, Massachusetts Institute of Technology
- 10/2016 *Partial regularity for doubly nonlinear parabolic systems*. 78th Midwest PDE Seminar, Loyola University Chicago
- 10/2016 *Extremal functions for Morrey's inequality in convex domains*. PDE seminar, University of Wisconsin - Madison
- 09/2016 *Extremal functions for Morrey's inequality in convex domains*. PDE seminar, University of North Carolina at Chapel Hill
- 08/2016 *PDE in finance*. Colloquium, University of Miami

- 07/2016 *Approximation schemes for optimal constants and extremal functions in Sobolev inequalities.* The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications
- 03/2016 *Approximation schemes for optimal Sobolev inequalities.* PDE Seminar, City University of Hong Kong
- 03/2016 *Approximation schemes for optimal Sobolev inequalities.* PDE Seminar, Chinese University Hong Kong
- 01/2016 *Approximation schemes for the optimal Poincaré inequality.* Colloquium, Drexel University
- 10/2015 *Extremal functions for Poincaré's inequality.* Undergraduate Colloquium, Morehouse College
- 10/2015 *Approximating p -ground states.* PDE/analysis seminar, Georgia Institute of Technology
- 05/2014 *A doubly nonlinear evolution for p -ground states.* Boston University/Brown Dynamics Seminar, Brown University
- 02/2014 *Inverse iteration for p -ground states.* Analysis Seminar, Temple University
- 11/2014 *Doubly nonlinear evolutions.* Blackwell–Tapia Conference, University of California–Los Angeles
- 11/2014 *Partial regularity and doubly nonlinear Evolutions.* Analysis and geometry seminar, Columbia University
- 09/2014 *An evolution equation for p -ground states.* PDE seminar, University of California–Berkeley
- 08/2014 *Option pricing in the large risk aversion, small transaction cost limit.* Colloquium, University of Miami
- 03/2014 *An evolution equation for p -ground states.* Analysis seminar, University of Pennsylvania
- 02/2014 *An evolution equation for p -ground states.* Colloquium, Howard University
- 01/2014 *Introduction to the Euler-Poisson system.* Joint meeting of the AMS/MAA
- 11/2013 *Infinity ground states.* Institut Mittag-Leffler
- 10/2013 *Infinity ground states.* PDE seminar, University of Arizona
- 10/2013 *Infinity harmonic functions.* Rainwater seminar, University of Washington
- 09/2013 *Uniqueness of solutions of Hamilton-Jacobi equations in the space of probability measures.* Math Science Research Institute
- 07/2013 *Hamilton-Jacobi Equations in the space of probability measures.* Workshop on interactions between dynamical systems and PDE, Universitat Politècnica de Catalunya
- 05/2013 *Plateau's rotating drops and rotational figures of equilibrium.* Colloquium, Drexel University
- 02/2013 *Infinity ground states.* PDE seminar, Purdue University
- 10/2012 *Infinity ground states.* Analysis seminar, Drexel University
- 07/2012 *Option pricing in the large risk aversion, small transaction cost limit.* Summer School in Financial Math, Instituto Superior Tècnico

- 06/2012 *Hamilton Jacobi Equations in the space of probability measures*. Nonlinear analysis seminar, Universität zu Köln
- 06/2012 *Option pricing in the large risk aversion, small transaction cost limit*. International conference on free boundary problems
- 03/2012 *Least volume convex bodies of constant width*. Postdoc seminar, Courant Institute
- 02/2012 *Option pricing in the large risk aversion, small transaction cost limit*. Analysis seminar, Cornell University
- 02/2012 *Viscoelastic Navier Stokes equations*. Colloquium, Washington University
- 02/2012 *Option pricing in the large risk aversion, small transaction cost limit*. PDE seminar, University of Minnesota
- 02/2012 *Viscoelastic Navier Stokes equations*. PDE seminar, Georgia Institute of Technology
- 02/2012 *Viscoelastic Navier Stokes equations*. Colloquium, Tulane University
- 01/2012 *Viscoelastic Navier Stokes equations*. Analysis seminar, University of Pennsylvania
- 10/2012 *Infinity ground states*. Analysis seminar, Drexel University
- 05/2011 *Ground states of the infinity Laplacian*. Conference for African American Researchers in the Mathematical Sciences, University of California – Los Angeles
- 05/2011 *Option pricing in the large risk aversion, small transaction cost limit*. Nonlinear PDE seminar, University of California–Irvine
- 03/2011 *The eigenvalue problem of singular ergodic control*. Probability seminar, Centro de Investigación en Matemáticas
- 01/2011 *Free boundary problems in mathematical finance*. Math Science Research Institute
- 11/2010 *Navier stokes and viscoelastic flow*. PDE seminar, University of California–Berkeley
- 11/2010 *Nonlinear partial differential equation and stochastic singular control*. Blackwell–Tapia Conference, Ohio State University
- 09/2010 *The eigenvalue problem of singular ergodic control*. Analysis seminar, Courant Institute
- 07/2010 *The eigenvalue problem of singular ergodic control*. PDE seminar, Instituto Superior Técnico
- 06/2010 *The eigenvalue problem of singular ergodic control*. Nonlinear analysis seminar, Universität zu Köln

UPENN FACULTY AFFILIATIONS

- 08/2014 – present The Graduate Group in Applied Mathematics and Computational Science
- 05/2014 – present The Center for the Study of Race and Equity in Education

UPENN STUDENT MENTORING

- Spring 2016 Kostis Karatapanis, PhD thesis advisory committee
- Spring 2016 Dominick Villano, Oral exam committee
- Spring 2016 Rebecca Lelko, Master's thesis supervisor
- Spring 2016 Aakash Parikh, Undergraduate research supervisor
- Fall 2015 Kostis Karatapanis, Oral exam committee
- Spring 2015 Chang Cao, Master's thesis committee
- Spring 2013 Matthew Klein, Master's thesis supervisor

COURSES TAUGHT

- Spring 2017 **Project Laboratory in Math**, *Massachusetts Institute of Technology*.
- Fall 2016 **Seminar in Geometry**, *Massachusetts Institute of Technology*.
- Spring 2016 **Mathematics of Finance**, *University of Pennsylvania*.
- Fall 2015 **Calculus for Wharton Students**, *University of Pennsylvania*.
- Optimal Transport**, *University of Pennsylvania*.
- Spring 2015 **Calculus Part I**, *University of Pennsylvania*.
- Fall 2014 **Partial Differential Equations**, *University of Pennsylvania*.
- Computer Methods in Math**, *University of Pennsylvania*.
- Spring 2014 **Calculus Part IV**, *University of Pennsylvania*.
- Mathematics of Finance**, *University of Pennsylvania*.
- Spring 2013 **Calculus Part IV**, *University of Pennsylvania*.
- Fall 2012 **Computer Methods in Math**, *University of Pennsylvania*.
- Spring 2012 **Calculus III**, *New York University*.
- Fall 2011 **Calculus II**, *New York University*.

UPENN MATHEMATICS DEPARTMENT SERVICE

- 2015-2016 Computer Committee
- Undergraduate Mathematics Society Chair
- Undergraduate Committee
- 2014-2015 Computer Committee
- Graduate Admissions Committee
- 2013-2014 Computer Committee
- Undergraduate Committee
- 2012-2013 Make Up Exams Committee
- Graduate Admissions Committee
- Fall 2012 – present Co-organizer of the Analysis Seminar

DIVERSITY RELATED SERVICE

- 09/2016 – 06/2017 *Diversity Committee*, MIT Mathematics Department
- 10/2015 *Black PhD Conference*, undergraduate poster competition judge

- 11/2014 *Blackwell-Tapia Conference* speaker
- 10/2014 *Black Men Getting Doctorates* panelist, Penn Summit on Black Male College Student Success
- 10/2014 *Launching your Academic Job Search and Handling Interviews and Job Talks* workshops leader, Black PhD Conference
- 06/2014 *Conference for African American Researchers in the Mathematical Sciences* poster contest judge
- 04/2014 *PhD thesis review* for a student from Universidad de las Ciencias Informáticas in Havana, Cuba
- 11/2013 *Berkeley Edge Conference* keynote speaker
- 10/2013 *Publish or Peril* panelist, Black PhD Conference
- 12/2011 – present Advisory Board, Black PhD Network
- 06/2011 *Conference for African American Researchers in the Mathematical Sciences* speaker
- 11/2010 *Blackwell-Tapia Conference* speaker

REFeree SERVICE

- 01/2017 Applied Math Letters
- 09/2016 Journal of Functional Analysis
- 04/2016 Transactions of the American Mathematical Society
- 10/2015 SIAM Journal of Mathematical Analysis
- 10/2015 SIAM Journal of Control and Optimization
- 10/2014 SIAM Journal of Mathematical Analysis
- 09/2014 Discrete and Continuous Dynamical Systems - Series A
- 01/2014 Nonlinear Analysis Series A: Theory, Methods & Applications
- 09/2013 Applied Mathematics Letters
- 04/2013 Journal of Mathematical Analysis and Applications
- 09/2012 Communications on Pure and Applied Analysis