Lyudmila Korobenko

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Academic positions

- Assistant Professor of Mathematics
  Reed College, *2017 - present*
- Hans Rademacher Instructor of Mathematics
  University of Pennsylvania, *2016 - 2017*
- NSERC Postdoctoral Fellow
  McMaster University, *2014 - 2016*
- Postdoctoral Fellow
  University of Calgary, *2013 - 2014*

Education

- University of Calgary, *2008 - 2013*
  PhD, Mathematics
  Advisor: Cristian Rios
  Thesis title: Regularity of solutions to a class of infinitely degenerate second order quasilinear equations
- Moscow Institute of Physics and Technology, *2006 - 2008*
  MS with Honors, Applied Mathematics and Physics
- Moscow Institute of Physics and Technology, *2002 - 2006*
  BS with Honors, Applied Mathematics and Physics

Research interests

I study Partial Differential Equations (PDEs) using some methods of harmonic analysis, geometric measure theory, and pseudodifferential calculus. Particular areas of interest include degenerate elliptic PDEs, quasilinear PDEs, regularity theory, analysis on metric measure spaces.

Awards and honors

- NSERC Postdoctoral Fellowship, 2014-2016
- UCalgary Dr. Chen Fong Chansellor's Club Doctoral Scholarship, 2012-2013

- UCalgary Chancellor's Challenge Graduate Scholarship, 2011 (declined)
- PIMS IGTC Fellowship, 2010-2012
- UCalgary Bettina Bahlsen Memorial Graduate Scholarship, 2009-2010
- UCalgary Henrietta Weyland Graduate Scholarship in Mathematics, 2008
- UCalgary Dean Entrance Scholarship, 2008

Publications[1]

- L. Korobenko, E. Sawyer, Sums of squares III: hypoellipticity in the infinitely degenerate regime, *preprint*, arXiv:2107.12451
- L. Korobenko, E. Sawyer, Sums of squares II: matrix functions, *preprint*, arXiv:2107.12505
- L. Korobenko, E. Sawyer, Sums of squares I: scalar functions, *submitted*, arXiv:2107.12840
- * U. Hafeez, T. Lavier, L. Williams, and L. Korobenko, Orlicz Sobolev inequalities and the Dirichlet problem for infinitely degenerate elliptic operators, *Electronic Journal of Differential Equations*, Vol. 2021 (2021), No. 82, 1–19.
- L. Korobenko, E. Sawyer, Continuity of infinitely degenerate weak solutions via the trace method, *Journal of Functional Analysis*, **281** (9), (2021), 109–170.
- L. Korobenko, Orlicz Sobolev inequalities and the doubling condition, *Annales Fennici Mathematici*, **46** (1), (2021), 153–161.
- L. Korobenko, C. Rios, E. Sawyer, R. Shen, Local boundedness, maximum principles, and continuity of solutions to infinitely degenerate elliptic equations with rough coefficients, *Memoirs of the AMS*, **269** (2021), No. 1311.
- J. Dong, L. Korobenko, D. Sezer, A variation of Merton's corporate bond valuation model for firms with illiquid but observable assets, *Quantitative Finance, Taylor & Francis Journals*, **20** (3), (2020), 483–497.
- T. Akhunov, L. Korobenko, C. Rios, Hypoellipticity without loss of derivatives for Fediĭ's type operators, *Journal of Pseudo-Differential Operators and Applications* **10** (3), (2019), 649–688.
- L. Korobenko, D. Maldonado, and C. Rios, From Sobolev inequality to doubling, *Proceedings of the AMS* **143** (9), (2015), 4017–4028
- E. Braverman, Md.Kamrujjaman, L.Korobenko, Competitive spatially distributed population dynamics models: Does diversity in diffusion strategies promote coexistence?, *Mathematical Biosciences* **264** (2015), 63–73.

[1] * indicates a paper with undergraduate students

- L. Korobenko, C. Rios, Hypoellipticity of certain infinitely degenerate second order operators, *Journal of Mathematical Analysis and Applications* **409** (2014), No. 1, 41–55
- L. Korobenko, E. Braverman, On evolutionary stability of carrying capacity driven dispersal in competition with regularly diffusing populations, *Journal of Mathematical Biology* **69** (5), (2014), 1181–1206
- L. Korobenko, M. K. Jaman and E. Braverman, Persistence and extinction in spatial models with carrying capacity driven diffusion and harvesting, *SIAM Journal on Applied Mathematics* **399** (2013), No. 1, 352–368
- L. Korobenko and E. Braverman, On logistic models with a carrying capacity dependent diffusion: stability of equilibria and coexistence with a regularly diffusing population, *Nonlinear Analysis Series B: Real World Applications* **13** (2012), No. 6, 2648–2658
- L. Korobenko and E. Braverman, On permanence and stability of a logistic model with harvesting and a carrying capacity dependent diffusion, *Journal of Nonlinear Systems and Applications* **2** (2011), No. 1-2, 9–15
- L. Korobenko and E. Braverman, A logistic model with a carrying capacity driven diffusion, *Can. Appl. Math. Quart.* **17** (2009), 85-100
- L. V. Korobenko, V. Zh. Sakbaev, Formulation and well-posedness of the Cauchy problem for a diffusion equation with discontinuous degenerating coefficients, *Computational Mathematics and Mathematical Physics* **49** (2009), No. 6, 1037–1053.
- L. V. Korobenko, On a description of a diffusion phenomena in discontinuous medium, *Some Problems of Fundamental and Applied Mathematics* (2008), 34-49 [in Russian].
- L. V. Korobenko, V. Zh. Sakbaev, Solution of the diffusion equation with discontinuous coefficient on a real line, *Some Problems of Fundamental and Applied Mathematics* (2007), 71–85 [in Russian].

Invited talks

Conferences

- *CMS Summer meeting,* St. John's (presenting online), June 4, 2022
- *Joint Mathematics Meetings*, Online, April 7, 2022
- *CMS 75th+1 Anniversary Summer Meeting, Ottawa* (online), June 9, 2021
- *Joint Mathematics Meetings*, Denver, CO, January 18, 2020
- *AMS Sectional Meeting*, University of Hawaii, Honolulu, HI, March 23, 2019
- *AMS Sectional Meeting*, Ohio State University, Columbus, OH, March 17, 2018
- *AMS Spring Central Sectional Meeting*, Indiana University, Bloomington, IN, April 2, 2017

- *2014 CMS Winter Meeting*, Hamilton, ON, December 5-8, 2014
- *2013 CMS Summer Meeting*, Halifax, NS, June 4-7, 2013

Seminars and colloquia

- *Math and Stats teaching seminar, "Ungrading"*, Dalhousie University, Online, March 29, 2022
- *PIMS Geometric Analysis Seminar*, University of Calgary, Online, February 4, 2022
- *McMaster Women in Math (MWM) seminar series*, McMaster University, Hamilton, ON, Canada, January 7, 2020
- *BCAM Analysis Seminar*, Basque Center for Applied Mathematics, Bilbao, Spain, November 26, 2019
- *Math Colloquium*, San Jose State University, San Jose, CA, October 18 2019
- *Geometric Analysis Seminar*, University of Oregon, Eugene, OR, May 14, 2019
- *Analysis Seminar*, Oregon State University, Corvallis, OR, May 21, 2018
- *Mathematics Colloquium*, Reed College, Portland, OR, March 9, 2017
- *Analysis Seminar*, University of Pennsylvania, Philadelphia, PA, April 19, 2016
- *Mathematics Colloquium*, Reed College, Portland, OR, February 4, 2016
- *Analysis Seminar*, University of Western Ontario, London, ON, December 1, 2015
- *Analysis Seminar*, University of Rochester, Rochester, NY, November 20, 2015
- *PDE/Analysis seminar*, McMaster University, Hamilton, ON, March 6, 2015
- *Seminar on holomorphic dynamics*, University of Calgary, Calgary, AB, April 1, 2011

Contributed talks and presentations

- *Barcelona Analysis Conference*, University of Barcelona, Barcelona, Spain, June 25, 2019
- *15th New Mexico Analysis Seminar*, University of New Mexico, Albuquerque, NM, February 19-21, 2016
- *6th Symposium on Analysis and PDEs*, Purdue University, West Lafayette, IN, June 1-4, 2015
- *Research Term on Real Harmonic Analysis and Applications to PDE*, Madrid, Spain, April-June, 2013
- *9th International Conference on Harmonic Analysis and Partial Differential Equations*, El Escorial, Madrid, Spain, June 11-15, 2012

- *Workshop for Women in Analysis and PDE, University of Minnesota*, Minneapolis, MN, May 30-June 2, 2012 [Poster presentation]
- *Conference in Harmonic Analysis and Partial Differential Equations in honour of Eric Sawyer*, Toronto ON, July 26-29, 2011
- *Doc-course: Harmonic Analysis, Metric Spaces and Applications to P.D.E.*, Seville, Spain, May 15-July 15, 2011
- *IGTC Summit and Workshop*, Naramata centre, Kelowna BC, Canada, October 1-3, 2010
- *Sixth Canadian Young Researchers Conference in Mathematics and Statistics*, University of Calgary, Calgary AB, Canada, July 17-19, 2009
- *50 anniversary scientific conference of MIPT*, Moscow Institute of Physics and Technology, Moscow, Russia, November 24-27, 2007
- *48 scientific conference of MIPT*, Moscow Institute of Physics and Technology, Moscow, Russia, November 26-29, 2005

Teaching

Reed College

- Topics in Analysis (MATH 411), Spring 2022 (Functional Analysis), Spring 2021 (PDE's), Spring 2019 (Fourier Analysis), Spring 2018 (Functional Analysis)
- Introduction to Analysis (MATH 112), Spring 2022, Fall 2020, Spring 2019, Fall 2018, Spring 2018
- Real Analysis (MATH 321), Fall 2021, Fall 2018, Fall 2017
- Vector Calculus (MATH 202), Spring 2021
- Calculus (MATH 111), Fall 2020
- Complex Analysis (MATH 311), Spring 2020
- Differential Equations (MATH 322), Spring 2020
- Independent Study (MATH 481), Spring 2020 (Harmonic functions on fractals)

University of Pennsylvania

- Topics in PDE's (MATH 645), Winter 2017 [Graduate class]
- Calculus III (MATH 240), Fall 2016
- Ideas in Mathematics (MATH 170), Fall 2016

McMaster Unviersity

- Linear Algebra II (MATH 2R03), Summer 2015

University of Calgary

- Introductory Statistics (STAT 213), Fall 2013
- Calculus I (MATH 249), Fall 2012, Winter 2012 (Co-Instructor with Dr. Viena Statsna, Mentorship program)

Senior thesis students

- Harry Chen (2021-2022), *Balls and Degenerate Elliptic Equations*
- Riley Waugh (2020-2021), *Regularity Theory of Degenerate Elliptic Partial Differential Equations*
- Nicholas Cecil (2020-2021), *Nets, Filters, and Convergence*
- Taylor Sedoo (2020-2021), *Exposing Chaos: Attracting Differences*
- Nick Chaiyachakorn (2020, Spring-Fall), *Three Easy Pieces in Harmonic Analysis: Singular Integrals, the Hardy Space H^1, and Boundedness Results*
- Co-advised:
  - Math-Physics: JR Cruise (2018-2019), Sean Allen (2018-2019), Sarah Racz (2017-2018)
  - Math-CS: Mike Kalange (2018-2019)
  - Math-Economics: Ethan Gordon (2018-2019)

Student summer research

- Summer 2021: Lucas Yong, Olly Millstein: Necessary and sufficient conditions for Orlicz-Poincaré inequalities on metric measure spaces
- Summer 2020: Lucas Yong (reading project): Introduction to fractal analysis
- Summer 2019: Usman Hafeez, Théo Lavier, Lucas Williams: Orlicz Sobolev inequalities and the Dirichlet problem for infinitely degenerate elliptic operators

Service

- Reed College
  - Colloquium organizer, 2021-2022
  - Mathematics Teacher-Scholar Symposium, Reed College, May 22-23, 2021, panelist

  - Grad school panel organizer, October 2021
  - MathFest (with David Krumm), April 2019
  - Search committees, 2019, 2020, 2021, 2022
  - Math/Physics committee, 2017-2022
  - IRB committee, 2017-2022
  - Library board, 2018-2019

- External
  - MAA Virtual Program panel "Keeping research alive", June 30, 2021, panelist
  - Reviewer for MathSciNet
  - Anonymous reviewer for several journals including Nonlinear Analysis: Real World Applications, Revista Matematica Complutense, Discrete and Continuous Dynamical Systems B, Proceedings of the Edinburgh Mathematical Society, Communications in PDE's