Daesung Kim

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Employment

J. L. Doob Research Assistant Professor, University of Illinois at Urbana–Champaign, August 2019–Present

Education

Ph.D. Mathematics, Purdue University (Advisor: Prof. Rodrigo Bañuelos), August 2019.

M.A. Mathematics, Seoul National University (Advisor: Prof. Panki Kim), August 2013.

B.S. Mathematics & B.A. Economics, Seoul National University, August 2011.

Research Interests

My research is at the interface between probability and analysis. In particular, research interest has focused on

- The study of functional and geometric inequalities
- The fluctuation behavior and the scaling limit of random sets arising from random walks
- Stochastic analysis for singular integrals, Fourier multipliers, and nonlocal operators.

Publications

[1] D. Kim, *Martingale transforms and the Hardy-Littlewood-Sobolev inequality for semigroups*, Potential Anal. **45** (2016), no. 4, 795–807. MR3558361

[2] R. Bañuelos and D. Kim, *Hardy-Stein identity for non-symmetric Lévy processes and Fourier multipliers*, J. Math. Anal. Appl. **480** (2019), no. 1, 123383, 20. MR3994925

[3] D. Kim, *Quantitative Inequalities for the Expected Lifetime of Brownian Motion*, Michigan Math. J. **70** (2021), no. 3, 615–634. MR4302556

[4] E. Indrei and D. Kim, *Deficit estimates for the logarithmic sobolev inequality*, Differ. Integral Equ. **34** (2021), no. 7/8, 437–466.

Preprints

[1] D. Kim, *Instability results for the logarithmic sobolev inequality and its application to related inequalities*, arXiv e-print (2018), available at arXiv:1805.06272. submitted.

[2] P. Dey and D. Kim, *Fluctuation results for size of the vacant set for random walks on discrete torus*, arXiv e-print (2021), available at arXiv:2108.06450. submitted.

[3] R. Bañuelos, D. Kim, and M. Kwaśnicki, *Martingle transform and their projection operators on $\mathbb{Z}^d$*, in preparation.

Talks

AMS Spring Central Virtual Sectional Meeting, Special session on the Interface Between Nonlinear PDEs, Harmonic Analysis, and Quantitative Geometric and Functional Inequalities, March 2022.

AMS Spring Central Virtual Sectional Meeting, Special session on Spectral Estimation and Optimization, March 2022.

Analysis seminar, University of Illinois at Chicago, March 2022

Probability seminar, University of Illinois at Urbana–Champaign, October 2021

AMS Spring Central Sectional Meeting, Special session on Probabilistic and diffusion methods in analysis and geometry, University of Cincinnati, in Zoom, April 2021.

Theory of Markov Semigroups and Schrödinger Operators, Wroclaw University of Technology, in Zoom, March 2021

Geometric and functional inequalities and recent topics in nonlinear PDEs, Purdue University, in Zoom, March 2021

Seminar on Non-local operators, probability and singularities, in Zoom, October 2020

The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Special session on PDEs and related topics, Atlanta, June 2020 (invited and canceled due to Covid)

International Conference on Elliptic and Parabolic Problems, Minisymposium, Gaeta, Italy, May 2019

AMS Spring Eastern Sectional Meeting, Special session on Stochastic processes, University of Connecticut Hartford, April 2019

Probability seminar, University of Illinois at Urbana–Champaign, April 2019

Probability seminar, Purdue University, February 2019

Probability seminar, Seoul National University, March 2018

Probability seminar, Purdue University, September 2017

Probability seminar, University of Illinois at Urbana–Champaign, March 2017

Probability seminar, Purdue University, February 2016

Conferences

Northeast Probability Seminar, CUNY, November 2019 (short talk session)

Functional inequalities in Probability, University of Connecticut, November 2018 (short talk session)

The 82nd Midwest PDE Seminar, Purdue University, October 2018

Recent Trends in Continuous and Discrete Probability, Georgia Institute of Technology, June 2018 (short talk session)

Seminar on Stochastic Processes, Brown University, May 2018

Summer School in Probability, Northwestern University, July 2016

3rd Conference on Nonlocal Operators and Partial Differential Equations, Bedlewo, Poland, June 2016

Conference on New Developments in Probability, Northwestern University, May 2016

Seminar on Stochastic processes, University of Maryland, March 2016 (short talk session)

Northeast Probability Seminar, New York University, November 2015 (short talk session)

37th Midwest Probability Colloquium, Northwestern University, October 2015

Conference in Stochastic Analysis and Related Topics, Purdue University, May 2015

Seymour Sherman Lecture and Conference, Indiana University, May 2015

10th Cornell Probability Summer School, Cornell University, July 2014

Seminar on Stochastic Processes, University of California at San Diego, March 2014

35th Midwest Probability Colloquium, Northwestern University, October 2013

Grants

Graduate Student International Travel Grant, Purdue University, 2019

Purdue University Graduate School Summer Research Grant, 2015–2018

BK21 Grant, National Research Foundation of Korea, 2011-2012

National Science Scholarship, Korean Student Aid Foundation, 2006–2011

Service

Co-organizer of UIUC probability seminar, Spring 2019–present

Mentor of Illinois Geometry Lab (undergraduate research experience program), Fall 2021

Reading course (Topic: Stability for spectral inequalities), Fall 2021

Teaching

MATH 403: Euclidean Geometry, Fall 2021

MATH 461: Probability Theory (2 sections), Spring 2021

MATH 285: Differential Equations, Fall 2020

MATH 285: Differential Equations (2 sections), Spring 2020

MATH 416: Linear Algebra, Fall 2019

Last updated: March 11, 2022