Chang-Han Rhee

CONTACT

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RESEARCH INTERESTS

Applied Probability, Simulation and Statistical Inference for Stochastic Processes, Rare-Event Analysis, Sensitivity Analysis, Energy Systems, Experimental Design, Statistical Learning.

ACADEMIC POSITIONS

Northwestern University, Evanston, IL, USA — 2018–Present
Industrial Engineering and Management Sciences
Assistant Professor

Centrum Wiskunde & Informatica, Amsterdam, Netherlands — 2015–2018
Stochastics Group
Postdoctoral Researcher

Georgia Institute of Technology, Atlanta, GA, USA — 2013–2015
Industrial & Systems Engineering and Biomedical Engineering
Postdoctoral Fellow

EDUCATION

Stanford University, Stanford, CA, USA — 2013
Ph.D. in Computational and Mathematical Engineering

Stanford University, Stanford, CA, USA — 2008
M.S. in Computational and Mathematical Engineering [1]

Seoul National University, Seoul, Korea — 2006
B.S. in Mathematics and B.S. in Computer Science

AWARDS

- **INFORMS Simulation Society Outstanding Simulation Publication Award, 2016**
- Finalist, INFORMS George Nicholson Student Paper Competition, 2013
- Best Student Paper Award (MS/OR focused), Winter Simulation Conference, 2012
- Samsung Fellowship, 2008–2012
- Seoul National University Merit Scholarship, 2005–2006

PUBLICATIONS

[1] "Sample-path large deviations for Lèvy processes and random walks with Weibull increments," with M. Bazhba, J. Blanchet, and B. Zwart. *Annals of Applied Probability.* 30(6): 2695–2739, 2020.

[2] "Sample-path large deviations for Lévy processes and random walks with regularly varying increments," with J. Blanchet and B. Zwart. *Annals of Probability.* 47(6): 3551-3605, 2019.

[3] "Sample-path large deviations for a class of heavy-tailed Markov additive processes" with B. Chen and B. Zwart. `arXiv:2010.10751`.

[4] "Sample-path large deviations for unbounded additive functionals of the reflected random walk," with M. Bazhba, J. Blanchet, B. Zwart. `arXiv:2003.14381`.

[1] Officially granted in 2013

[5] "Efficient rare-event simulation for multiple jump events in regularly varying random walks and compound Poisson processes," with B. Chen, J. Blanchet, and B. Zwart. *Mathematics of Operations Research*. 44(3): 919–942, 2019.

[6] "Queue length asymptotics for the multiple server queue with heavy-tailed Weibull service times," with M. Bazhba, J. Blanchet, and B. Zwart. *Queueing Systems*. 93(3–4): 195–226, 2019

[7] "Importance sampling of heavy-tailed iterated random functions," with B. Chen and B. Zwart. *Advances in Applied Probability*. 50(3): 805–832, 2018.

[8] "Lyapunov conditions for differentiability of Markov chain expectations: the absolutely continuous case," with P. W. Glynn. `arXiv:1707.03870`.

[9] "Space filling design for non-linear models," with E. Zhou and P. Qiu. `arXiv:1710.11616`. Under minor revision for publication in *Stochastic Systems*.

[10] "Unbiased estimation with square root convergence for SDE models," with P. W. Glynn. *Operations Research*, 63(5): 1026–1043, 2015. **2016 INFORMS Simulation Society Outstanding Simulation Publication Award.** The preprint of this paper was also recognized as a **Finalist in 2013 George Nicholson Student Paper Competition.**

[11] "Exact estimation for Markov chain equilibrium expectations," with P. W. Glynn. *Journal of Applied Probability (Special Jubilee Issue)*, 51A: 377-389, 2014.

[12] "Rare-event simulation for multiple jump events in heavy-tailed Lévy processes with infinite activities," with X. Wang. *Proceedings of the 2020 Winter Simulation Conference*, 2020.

[13] "An iterative algorithm for sampling from manifolds," with E. Zhou and P. Qiu. *Proceedings of the 2014 Winter Simulation Conference*, 2014.

[14] "A new approach to unbiased estimation for SDEs," with P. W. Glynn. *Proceedings of the 2012 Winter Simulation Conference*, 2012. **Best MS/OR focused Student Paper.**

Working Papers

[15] "Almost always avoiding sharp minima with stochastic gradient descent," with X. Wang and S. Oh.

[16] "Sample-path large deviations for Lévy processes and random walks with regularly varying increments in multiple dimensions," with Z. Su.

[17] "Sample-path large deviations for Lévy driven Stochastic Differential Equations," with Z. Su and X. Wang.

[18] "Strongly efficient rare-event simulation for multiple jump events in regularly varying Lévy processes with infinite activities," with X. Wang.

[19] "Queue length asymptotics for the queueing networks with heavy-tailed Weibull input," with M. Bazhba and B. Zwart.

[20] "On heavy-tailed estimators," with B. Chen, Z. Su, and B. Zwart.

[21] "Rare-event simulation for electric power distribution networks with high variability," with N. Vasmel, and B. Zwart.

[22] "Quasi-variational problems in heavy-tailed large deviations theory," with B. Zwart and J. Blanchet.

[23] "Lyapunov conditions for differentiability of Markov chain expectations: the contracting case," with P. W. Glynn.

Student Mentoring

PhD Students:

- Bohan Chen (CWI Stochastics): co-supervised with Bert Zwart; defended in December 2019; first position: Munich Re

- Mihail Bazhba (CWI Stochastics): co-supervised with Bert Zwart; expected to defend in 2021

- Zhe Su (Northwestern IEMS): expected to graduate in 2022

- Xingyu Wang (Northwetern IEMS): expected to graduate in 2023

MS Students:

- Jingyi Zhao (Northwestern ESAM): graduated in March 2020

Services

Editorial Service:
- Associate Editor, *INFORMS Journal on Computing*, 2019–Present

Award Committee:
- 2019,2020 Winter Simulation Conference PhD Colloquium Committee
- 2020 George Nicholson Prize Committee

Program Committee:
- 2019 Applied Probability Society Conference
- 2019 Monte Carlo Methods
- 2016, 2018, 2019 Winter Simulation Conference (Analysis and Methodology Track)
- 2017, 2018 International Conference on Machine Learning (Reviewer)

Referee:
Annals of Applied Probability, Operations Research, Mathematics of Operations Research, Management Science, Electronic Journal of Probability, Stochastic Systems, Bernoulli, Advances in Applied Probability, INFORMS Journal on Computing, IIE Transactions on Automatic Control, Journal of Simulation, Proceedings of the Winter Simulation Conference, Proceedings of the 2016 MCQMC

Talks and Tutorials

Tutorial: Mathematics for Simulation

- I-SIM Workshop Simulation Summer School Tutorial, June 2020 (postponed due to COVID-19)

Sample path LDP for heavy-tailed processes and efficient rare-event simulation

- I-SIM Workshop, State College, June 2020 (postponed due to COVID-19)
- International Workshop on Applied Probability, Thessaloniki, June 2020 (postponed due to COVID-19)
- Heavy Tails Workshop, Eindhoven, December 2019
- Applied Probability Society Conference, Brisbane, July 2019
- MCM 2019, Sydney, July 2019
- International Workshop on Stress Test and Risk Management, Paris, May 2019
- Applied Math Colloquium, Illinois Institute of Technology, March 2019
- SIAM CSE, Spokane, February 2019
- RESIM 2018, Stockholm, August 2018
- ISysE department, KAIST, August 2018

- MCQMC 2018, Rennes, July 2018
- Stochastics Colloquium, Eindhoven University of Technology, May 2018
- IEOR department, University of California at Berkeley, March 2018
- ORIE, University of Texas at Austin, February 2018
- ISEM department, National University of Singapore, February 2018
- IEMS department, Northwestern Univeristy, February 2018
- Mark Kac Lecture, Utrecht, November 2017
- INFORMS Annual Meeting, Houston, October 2017
- Applied Probability Society Conference, Evanston, July 2017
- Extreme Value Analysis Conference, Delft, June 2017
- INFORMS Annual Meeting, Nashville, November 2016
- IBM Watson, September 2016
- Lévy 2016 Summer School, July 2016

Perfect estimation with imperfect samplers

- ORIE department, Cornell University, April 2017
- Operations Research Seminar, Tinbergen Institute, December 2016
- Computational Statistics Seminar, Oxford University, November 2016
- Retrospective Monte Carlo Workshop, University of Warwick, July 2016
- Applied Mathematics Department, Ecole Polytechnique, Paris, June 2016
- IMS-ISBA Joint Meeting MCMSki 2016, Lenzerheide, January 2016
- Scientific Meeting, Centrum Wiskunde & Informatica, November 2015
- OR department, Naval Postgraduate School, August 2015
- IE department, Seoul National University, December 2014
- IME department, Pohang University of Science and Technology, December 2014
- SME department, Sungkyunkwan University, December 2014
- Applied Probability Seminar, Georgia Tech, September 2014
- ISE department, Virginia Tech, March 2014
- ISysE department, Korean Advanced Institute of Sceince and Technology, December 2013
- INFORMS Annual Meeting, Minneapolis, October 2013
- ICME Colloquium, Stanford University, February 2013
- Winter Simulation Conference, Berlin, December 2012

Sensitivity analysis for Markov chains

- Queueing Colloquium, Centrum Wiskunde & Informatica, May 2016
- INFORMS Annual Meeting, San Francisco, November 2014
- SIAM Seminars on Current Research in Engineering & Applied Mathematics, Stanford, March 2012

Space filling design for nonlinear models

- Applied Probability Society Conference, Brisbane, July 2019
- MCM 2019, Sydney, July 2019

- Winter Simulation Conference, Savannah, December 2014
- INFORMS Annual Meeting, Phoenix 2018

Debiased MLMC for rare event simulation of stochastic recursions

- MCQMC 2016, Stanford University, August 2016

Perfect estimation and response-surface-filling design

- ISysE department, Korean Advanced Institute of Sceince and Technology, March 2015
- IME department, Pohang University of Science and Technology, February 2015
- ISE department, University of Illinois at Urbana-Champaign, February 2015

Teaching

Northwestern University, Evanston, IL, USA

Instructor

- IEMS 435: Stochastic Simulation (Fall 2018, Winter 2020)
- IEMS 315: Stochastic Models (Winter 2019, Spring 2020, Fall 2020)

Stanford University, Stanford, CA, USA

Instructor

- CME 001: Math Refresher Course (Summer 2011)

Teaching Assistant

- CME 100: Vector Calculus (Autumn 2012)
- MS&E 322: Stochastic Calculus and Control (Spring 2012)
- MS&E 121: Introduction to Stochastic Modeling (Winter 2007)