

## Jinsu Kim

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CONTACT INFORMATION	Room 305, Mathematical Science Building, jinsukim@postech.ac.kr POSTECH 77 Cheongam-ro, Hyogok-dong, Nam-gu, Pohang-si, <a href="http://mathjinsukim.com">http://mathjinsukim.com</a> Gyeongsangbuk-do, Korea Republic
RESEARCH INTERESTS	Probability, Reaction networks, Mathematical systems biology, System biology, Epigenetic dynamics, Markov processes, Mixing times of Markov models.
EMPLOYMENT	<b>POSTECH</b> September 2021–present, Assistant Professor at Department of Mathematics  <b>University of California, Irvine</b> July 2020–August 2021, Postdoctoral fellow at the NSF-Simons Center for Multiscale Cell Fate Research. August 2018– August 2021, Postdoctoral scholar at Department of Mathematics. <ul style="list-style-type: none"><li>• Mentor : German Enciso</li></ul>
EDUCATION	<b>University of Wisconsin-Madison</b> 2012–2018, Ph.D., Mathematics. <ul style="list-style-type: none"><li>• Thesis Topic : <i>Stochastically modeled reaction networks: positive recurrence and mixing times</i></li><li>• Advisor: David F. Anderson</li></ul> <b>Seoul National University</b> , Republic of Korea. 2005–2012, B.S., Mathematics ( <i>military service</i> 2007–2009)
PREPRINTS	1. David F. Anderson, Daniele Cappelletti, Wai-Tong (Louis) Fan, and Jinsu Kim. <i>Mixing times for stochastically modeled reaction networks</i> , in preparation. .
PUBLICATIONS	1. Hyukpyo Hong, Bryan S. Hernandez, Jinsu Kim, and Jae Kyoung Kim, <i>Computational translation framework identifies biochemical reaction networks with special topologies and their long-term dynamics</i> , accepted to SIAM Journal of Applied Mathematics, 2022. 2. David F. Anderson and Jinsu Kim, <i>Mixing times for two classes of stochastically modeled reaction networks</i> , Mathematical Biosciences and Engineering, 2023, 20(3), 4690-4713. 3. Jinsu Kim*, Katherine Sheu*, Quen Cheng, Alexander Hoffmann, and German Enciso. <i>Stochastic models of nucleosome dynamics reveal regulatory rules of stimulus-induced epigenome remodeling</i> , Cell Report, 2022. <a href="https://doi.org/10.1016/j.celrep.2022.111076">https://doi.org/10.1016/j.celrep.2022.111076</a> 4. German Enciso and Jinsu Kim, <i>Accuracy of Multiscale Reduction for Stochastic Reaction Systems</i> , Multiscale Modeling and Simulation 19(4), 1633–1658, 2021. <a href="https://doi.org/10.1137/19M1301928">https://doi.org/10.1137/19M1301928</a> <a href="https://arxiv.org/abs/1909.11916">https://arxiv.org/abs/1909.11916</a> .

5. Hyuckpyo Hong\*, Jinsu Kim\*, M Ali Al-Radhawi, Eduardo Sontag and Jae Kyoung Kim, *Derivation of stationary distributions of biochemical reaction networks via structure transformation*, Communications Biology, 4, 620 (2021).  
<https://doi.org/10.1038/s42003-021-02117-x>
6. German Enciso, Radek Erban and Jinsu Kim, *Identifiability of Stochastically Modeled Reaction Networks*, European Journal of Applied Mathematics, 1-23, 2021. <https://doi.org/10.1017/S0956792520000492>  
<https://arxiv.org/abs/2006.02272>
7. Jinsu Kim, Jason K. Dark, German Enciso, and Suzanne S. Sindi. *Slack Reactants: A State-Space Truncation Framework to Estimate Quantitative Behavior of the Chemical Master Equation*, The Journal of Chemical Physics, 153(054117), 2020.  
<https://doi.org/10.1063/5.0013457>
8. Enrico Bibbona, Jinsu Kim and Carsten Wiuf, *Stationary distributions of systems with Discreteness Induced Transitions*, Journal of Royal Society Interface, 17:20200243, 2020.  
<https://doi.org/10.1098/rsif.2020.0243>
9. Jinsu Kim and German Enciso, *Absolutely Robust Controllers for Stochastic Chemical Reaction Networks*, Journal of Royal Society Interface, 17: 20200031, 2020.  
<https://doi.org/10.1098/rsif.2020.0031>.
10. David F. Anderson, Daniele Cappelletti, Jinsu Kim and Tung Nguyen *Tier structure of strongly endotactic reaction networks and applications to stochastic models*, Stochastic Processes and their Applications, 130, 7218-7259, 2020..  
<https://doi.org/10.1016/j.spa.2020.07.012>
11. David F. Anderson, Daniele Cappelletti and Jinsu Kim, *Stochastically modeled weakly reversible reaction networks with a single linkage class*, Journal of Applied Probability, 57(3):792–810, 2020. <https://dx.doi.org/10.1017/jpr.2020.28>
12. German Enciso and Jinsu Kim, *Embracing Noise in Chemical Reaction Networks*, J. Bull Math Biol, 81, 1261–1267, 2019.  
<https://doi.org/10.1007/s11538-019-00575-3>
13. David F. Anderson and Jinsu Kim, *Some network conditions for positive recurrence of stochastically modeled reaction networks*, SIAM J. Appl. Math., 78(5), 2692–2713., 2018.  
<https://doi.org/10.1137/17M1161427>

#### GRANTS

- NRF Basic Science Research Institute Fund (No. 2022R1C1C1008491) 2/2022-2/2026
- POSCO HOLDINGS (2022Q019). 10/2022-10/2023
- NRF Basic Science Research Institute Fund (No. 2021R1A6A1A10042944). 3/2023-2/2025
- NRF Basic Science Research Institute Fund (No. 2021R1A6A1A10042944). 2/2022-2/2023
- NRF Basic Science Research Institute Fund (No. 2021R1A6A1A10042944). 9/2021-2/2022
- Interdisciplinary Opportunity Award program at the NSF-Simon Center for Multiscale Cell Fate. 11/2018-10/2020  
(Co-PI: Katherine Sheu at UCLA) \$10,000

## AWARDS

### Research Award

- Best poster, the NSF-Simon Center for Multiscale Cell Fate 2020 annual meeting.

### Teaching award

- Nominated for the Most Promising Future Faculty Award, University of California, Irvine. January 2020
- Teaching Assistant Award, Department of Mathematics, University of Wisconsin-Madison. Spring 2013
- Honored Instructor Award, Division of University Housing, University of Wisconsin-Madison. November 2012

### Travel Awards

- Research visit (supported by Louis Fan), Indiana University. February 2020
- Conference Presentation Funds of University of Wisconsin-Madison Dec 2017
- 2017 annual meeting of Society for Mathematical Biology July 2017
- 2017 annual meeting of SIAM July 2017
- MSRI summer program January 2011  
*Seminaire de Mathematiques Superieures 2016: Dynamics of Biological Systems*

### Scholarship

- Merit-based scholarship, Lotte scholarship foundation 2009–2011

## TALKS

- Math Colloquium at Seoul National University , Seoul. March 2023
- ReaDiNet 2023 conference, France & Online. January 2023
- APCTP Non-equilibrium in physics and biology workshop, Gyeongju. December 2022
- KSIAM fall workshop 2022, Jeju, November 2022.
- NSF-Simon Center for Multiscale Cell Fate annual meeting 2022, University of California, Irvine. October 2022
- 2022 Global KMS International Conference, Seoul, October 2022.
- UNIST, Math colloquium, Ulsan, September 2022.
- Yonsei University, Math colloquium, Seoul, September 2022.
- BIRS Workshop "Preparing for the next pandemic", UBC Okanagan, June 2022.
- KSMB annual meeting 2022, Yeosu, June 2022.
- KSIAM spring meeting 2022, Daejeon IBS, May 2022.
- A talk series for stochastic models of chemical reaction networks at NTHU. Online. February–May 2022
- Korea Mathematical Society spring meeting 2022, Online. May 2022
- MEEting Journal Club, Physics Department Inha University . April 2022
- POSTECH MINDS & IBS BIMAG & APCTP encountering, POSTECH. April 2022
- KAIST Math Colloquium, Online. March 2022
- Probability and applied math seminar, University of Nottingham, Online. January 2022
- IBS BIMAG journal club, Daejeon, January 2022
- KSMB Winter meeting, Jeju. December 2021
- Biophysics journal club, POSTECH. November 2021
- KSIAM Fall meeting, Busan BEXCO. December 2021
- Frontiers in Theoretical Biophysics, APTCP, Gyungju, November 2021
- Math Colloquium, POSTECH, Online. November 2021
- ReaDiNet 2021 conference, Online. October 2021
- Applied Math Colloquium, University of Maryland, Baltimore County, Online. October 2021

- 2021 ONRC Research Day, POSTECH, Online. October 2021
- APCTP Nonequilibrium collective phenomena workshop, Gyeonju. September 2021
- AIM Online workshop on "Limits and control of stochastic reaction networks" July 2021
- SMB annual meeting 2021, Online. June 2021
- SIAM on Applications of Dynamical Systems 2021, Online. May 2021
- IBS Biomedical Mathematics Group Seminar, IBS Korea. April 2021
- AMS Postdoc Talk - Mathematics & Biology, University of California, Irvine. April 2021
- CRM-ISM Probability/Applied Math Seminar, Online seminar. April 2021
- Mathematics of Reaction Networks, Online seminar. January 2021
- Applied Math Seminar, University of California, Santa Cruz. January 2021
- 2020 Korea Mathematical Society Fall meeting, Virtual workshop October 2020
- Probability seminar, University of Illinois Urbana-Champaign, October 2020
- 2020 Society for Mathematical Biology annual meeting, Virtual workshop. August 2020
- 2020 Korea Mathematical Society Spring meeting, Virtual workshop July 2020
- Early Career Researcher Symposium, Center for Multiscale Cell Fate Research, University of California, Irvine. May 2020
- Mathematical and Computational Methods in Biology, MBI. May 2020
- Probability seminar, Indiana University Bloomington. February 2020
- Mathbio seminar, University of California, Merced. December 2019
- AMS sectional meeting, University of California, Riverside. November 2019
- The 2nd Annual Symposium on Multiscale Cell Fate, University of California, Irvine. October 2019
- PDE/Applied math seminar, University of California, Riverside. October 2019
- Probability seminar, Indiana University Bloomington. September 2019
- AMS sectional meeting, University of Wisconsin, Madison September 2019
- 2019 Society for Mathematical Biology annual meeting, Montréal, Canada. July 2019
- Chemical reaction network workshop, DISMA Politecnico di Torino, Turin, Italy. July 2019
- Mathematical biology seminar, Korea Advanced Institute of Science and Technology (KAIST). May 2019
- Probability seminar, Tulane University. March 2019
- Biophysics and Systems Biology Seminar, University of California, Irvine March 2019
- Early-Career Research Symposium 2019, NSF-Simon Center for Multiscale Cell Fate, University of California, Irvine March 2019
- Analysis seminar, Korean Institute for Advanced Study (KIAS). December 2018
- Probability seminar, University of California, Irvine December 2018
- SIAM LS 2018 Annual Meeting, Minnesota, USA. August 2018
- Recent trends in continuous and discrete probability at Georgia tech. March 2018
- Probability seminar, University of Washington. January 2018

- Joint Mathematics Meeting 2018. January 2018
- Applied mathematics seminar,  
Pohang University of Science and Technology. December 2017
- Probability seminar, University of Wisconsin-Milwaukee October 2017
- 2017 annual meeting of Society of Mathematical Biology July 2017
- BIRS, Mathematical Analysis of Biological Interaction Networks June 2017
- 2107 Korean Math Society Spring meeting April 2017
- Probability seminar, Iowa State University December 2016
- Probability seminar  
*Sufficient Conditions for Ergodicity of Stochastic Reaction Networks  
and Mixing Times* April 2017
- Reaction network seminar  
*Lyapunov Functions for Chemical Reaction Network Theory* April 2017
- Graduate probability seminar  
*Donsker's theorem and its applications* March 2017
- Graduate probability seminar  
*Coupling of random variables and applications for mixing times* October 2016
- Graduate probability seminar  
*Foster-Lyapunov criteria for positive recurrence of Markov Chains* February 2016
- Graduate probability seminar  
*Fundamental limits on the suppression of molecular fluctuations* April 2015
- Graduate Applied Math Seminar  
*Flagellar synchronization through direct hydrodynamic interactions* August 2014
- Physics and applied math seminar  
*Intermittent flow in Yield-Stress fluids slows down chaotic mixing* November 2013
- RTG Seminar on mathematical fluid mechanics and applications  
*On squirt singularities in hydrodynamics* February 2013

## TEACHING

University of California, Irvine.

- 2020 Fall Math 2A (Calculus 1, Online).
- 2019 Fall Math 2A (Calculus 1).

University of Wisconsin-Madison

- 2017 Fall Math320 (Differential equations and Linear Algebra)
- 2016 Fall Math375 (Multi-Variable Calculus and Linear Algebra)
- 2016 Spring Math222 (Calculus 2) WES
- 2015 Fall Math221 (Calculus 1) WES
- 2015 Summer PEOPLE program (Calculus for Precollege students)
- 2015 Spring Math320 (Linear Algebra and Differential Equation)
- 2014 Fall Math213 (Calculus for Business)
- 2014 Summer PEOPLE program (Calculus for Precollege students)  
(<https://peopleprogram.wisc.edu/>)
- 2014 Spring Math213 (Calculus for Business)
- 2013 Fall Math234 (Calculus 3)
- 2013 Spring Math222 (Calculus 2)
- 2012 Fall Math222 (Calculus 2) WES  
(<https://www.math.wisc.edu/undergraduate/wes>)

MENTORING	<ul style="list-style-type: none"> <li>• Minseo Kim (Beckman High School, Tustin), November 2020– Research topic: Revealing the Effect of Hydration in Kidney Stone Formation Through Timescale Decomposition Analysis</li> <li>• Direct reading program at University of Wisconsin-Madison Spring 2017 : Mentoring undergraduate students for research on mathematical biology</li> </ul>
SERVICE	<p>Editorial Board</p> <ul style="list-style-type: none"> <li>• The Journal Mathematical Biosciences &amp; Engineering July 2021– Special Issue of “Stochastic methods for biological systems”</li> </ul> <p>Organization</p> <ul style="list-style-type: none"> <li>• POSTECH MINDS &amp; IBS BIMAG &amp; APCTP April 2022 encountering, POSTECH.</li> <li>• KSIAM Fall meeting 2021, Minisymposium December 2021 “stochastic biochemical systems”.</li> <li>• Global point of contact (Asia region), Virtual SMB 2021 June 2021</li> <li>• California Workshop on the Mathematics of Reaction Networks June 2020 University of California, Irvine (with German Enciso, Badal Joshi, Polly Yu) (Canceled due to COVID-19)</li> <li>• SIAM Life Science 2020 meeting, Minisymposium organizer: June 2020 Stochastic Modeling of Biochemical Reaction Networks and Applications (with German Enciso) (Canceled due to COVID-19)</li> </ul> <p>Others</p> <ul style="list-style-type: none"> <li>• Q&amp;A panel, MathBioU and MathExpLR at UCI July 2020 (a summer research program for high school and undergraduate students)</li> <li>• Mega Math May 2016 : Grader role in mathematics competition for fifth and sixth grade students in south-central Wisconsin</li> </ul>
REFEREE	<ul style="list-style-type: none"> <li>• SIAM journal on applied dynamical systems</li> <li>• International Journal of Robust and Nonlinear Control</li> <li>• Journal of the Korean Mathematical Society</li> <li>• Journal of Mathematical Biology</li> <li>• PLOS Computational Biology</li> <li>• PLOS one</li> <li>• Physical Biology</li> <li>• Bulletin of Mathematical Biology</li> <li>• SIAM journal on Applied Mathematics</li> <li>• Discrete and Continuous Dynamical Systems - Series B</li> <li>• European Journal of Applied Mathematics</li> </ul>