

DOHYEON (DANIELLE) KIM

Applied and Comput. Math., Caltech, Pasadena, CA 91125

Homepage: www.doh-yeon-kim.com

E-mail: dohyeon@caltech.edu

Note: Pre-PhD dates have been omitted for brevity. A full version with dates is available upon request.

RESEARCH INTEREST

My research focuses on interacting particle systems and their mean-field limits, particularly in optimization, sampling, and collective dynamics. I study quantitative propagation of chaos, stability, and long-time behavior using probabilistic and PDE methods. I am also interested in kinetic theory, with focus on the derivation and long-time analysis of kinetic equations arising from microscopic stochastic particle dynamics.

EDUCATION

California Institute of Technology

September 2021 - Expected June 2027

Ph.D. Candidate in Applied and Computational Mathematics

GPA: 4.24/4.3

Advisor: Prof. Franca Hoffmann (since May 2023)

Yonsei University

BBA in Business Administration and BS/MS in Mathematics

GPA: 4.29/4.3 (4.0/4.0)

Graduated with Highest Distinction, Valedictorian (1/2674)

Approximately 60 courses (16 from Business, 20 from upper-level & Graduate Math)

Master's thesis: "Solvability of Second-Order Elliptic and Parabolic Equations with VMO-Type Coefficients"

Advisor: Prof. Seick Kim

- GRE: V 162 (90%), Q 169 (96%), AW 4.5 (81%)
- GRE Math Subject Test: 910 (96%)

Columbia University

1-year Study Abroad Program (Undergraduate)

GPA: 3.9/4.0

Took 8 upper-level Math Courses

PUBLICATIONS AND PREPRINTS

Note: For all works in this section, authors are listed alphabetically, as is customary in mathematics.

Quantitative Target Convergence and Uniform-in-Time Propagation of Chaos for Langevin-Regularized SVGD

Sayan Banerjee, **Dohyeon Kim**

Submitted, <https://arxiv.org/abs/2608.28827> (August 2026)

Long-time Stability and Convergence of Particle Swarm Optimization

Giacomo Borghi, Hui Huang, **Dohyeon Kim**

Submitted, <https://arxiv.org/abs/2607.24696> (July 2026)

Uniform-in-time propagation of chaos for Second-Order Consensus-Based Optimization

Seung-Yeal Ha, Franca Hoffmann, **Dohyeon Kim**

Preprint, <https://arxiv.org/abs/2605.20697> (May 2026)

Uniform-in-time propagation of chaos for Consensus-Based OptimizationNicolai Gerber, Franca Hoffmann, **Dohyeon Kim**, Urbain VaesSubmitted, <https://arxiv.org/abs/2505.08669> (May 2025)**MirrorCBO: A consensus-based optimization method in the spirit of mirror descent**Leon Bungert, Franca Hoffmann, **Doh Yeon Kim**, Tim Roith*Mathematical Models and Methods in Applied Sciences*, 2025<https://arxiv.org/abs/2501.12189> (January 2025)**Mono-cluster flocking and uniform-in-time stability of the discrete Motsch–Tadmor model**Seung-Yeal Ha, Franca Hoffmann, **Dohyeon Kim**, Wook YoonTo appear in *Communications in Pure and Applied Analysis*, 2026<https://arxiv.org/abs/2408.10213> (July 2024)**MANUSCRIPTS IN PREPARATION****Long Time Behavior of Consensus-Based Sampling beyond Gaussian Initial Data****Dohyeon Kim**

Manuscript in preparation.

Long-Time Profile Asymptotics and Fisher-Information Bounds for Dynamically Regularized Consensus-Based Optimization**Dohyeon Kim**, Wuchen Li, Franca Hoffmann

Manuscript in preparation.

Mean-Field Well-Posedness and Exponential Gaussian Convergence for Localized Consensus-Based SamplingArne Bouillon, Kathrin Hellmuth, Franca Hoffmann, **Dohyeon Kim** (alphabetical ordering)

Manuscript in preparation.

Towards Convergence Guarantees for Particle Swarm OptimizationRitvik Teegavarapu, **Dohyeon Kim**, Franca Hoffmann

Manuscript in preparation.

CONFERENCES AND OTHER EVENTS**(Upcoming) Oberwolfach Workshop: Variational Methods for Evolution** *December 13–18, 2026*

Invited Participant, Mathematisches Forschungsinstitut Oberwolfach, Germany

(Upcoming) Research Visit at BICMR*October 17–25, 2026*

Hosted by Prof. Zhenfu Wang

Beijing International Center for Mathematical Research, Peking University, Beijing, China

(Upcoming) Interacting Particle Systems and Their Applications*October 5–16, 2026*

Invited Speaker; talk on uniform-in-time propagation of chaos for CBO, with related results for Langevin-regularized SVGD

Institute for Mathematical Sciences, National University of Singapore, Singapore

Partial Differential Equations for Many Particles Systems*August 2026*

Poster Presentation: “Uniform-in-time Propagation of Chaos for First- and Second-Order CBO”

ICERM, Brown University, Providence, Rhode Island

BIRS–IASM Workshop: Interacting Particle Systems:**Theoretical Innovations and Practical Applications***June–July 2026*

Invited Speaker (virtual), Talk: “Uniform-in-time Propagation of Chaos for First- and Second-Order CBO”

Institute for Advanced Study in Mathematics, Hangzhou, China

**13th Summer School on Methods and Models of Kinetic Theory
(M&MKT 2026)**

June 2026

Poster Presentation: “Uniform-in-time Propagation of Chaos for First- and Second-Order CBO”
Pesaro, Italy

SIAM Conference on Uncertainty Quantification (UQ26)

March 2026

Speaker, Talk: “Uniform-in-time Propagation of Chaos for Consensus-Based Optimization”
Minneapolis, Minnesota

**Pathways Workshop & Introductory Workshop:
Kinetic Theory & Stochastic Partial Differential Equations**

August 2025

Participant, UC Berkeley, Simons Laufer Institute

Frontiers in Applied Analysis

June 2025

Poster Presentation: “Uniform-in-time Mean Field Limit for Consensus-Based Optimization (CBO)”
Carnegie Mellon University

SIAM Dynamical Systems

May 2025

Session Organizer and Speaker, Talk: “Uniform-in-time Mean Field Limit for Consensus-Based Optimization (CBO)”

Mini-Symposium title: MS 47, 65, 83 series, “Collective Dynamics in Multi-Agent Systems: Advances in Learning and Optimization”
Denver, Colorado

**AIM Workshop: Integro-differential Equations
in Many-Particle Interacting Systems**

April 2025

Participant, American Institute of Mathematics, Pasadena, California

SOCAMS 2025

April 2025

Invited Talk: “Uniform-in-time Mean Field Limit for Consensus-Based Optimization (CBO)”
University of California, Riverside, California

SIAM Mathematics of Data Science

October 2024

Poster Presentation: “Recent Developments in Consensus Based Optimization (CBO)”

Mini-Symposium title: MS 27 “Interacting Particle Systems in Data Science: From Theory to Applications”

Atlanta, Georgia

Junior Kinetic Theory Workshop, Yonsei University

September 2024

Invited Talk: “Uniform-in-time Mean Field Limit for Consensus-Based Optimization (CBO)”

9th European Congress of Mathematics (ECM)

July 2024

Invited Talk: “Uniform-in-time Mean Field Limit for Consensus-Based Optimization (CBO)”

Seville, Spain

Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs

July 2024

Participant, ETH Zurich

CIRM – Mathematical Biology: Collective Behavior and Pattern Formation

July 2024

Poster Presentation: Mono-cluster flocking and uniform-in-time stability of the discrete Motsch-Tadmor model

CIRM, Marseille, France

CIRM – Frontiers in Interacting Particle Systems, Aggregation-Diffusion Equations & Collective Behavior

June 2024

Participant, CIRM, Marseille, France

SOCAMS 2024

April 2024

Speaker, Talk: “Recent developments in Consensus-Based Optimization (CBO)”
University of California, San Diego, California

ICIAM, Tokyo*August 2023*

Participant, Tokyo, Waseda University, Japan

Purpose-Driven Particle Systems, Lorentz Center*March 2023*

Participant, Lorentz Center, Leiden, Netherlands

HONORS & AWARDS**Graduation with Highest Distinction**

Graduation Ceremony Valedictorian

Yonsei University

Amore Pacific President Award

Alumni Association Presidential Award

Yonsei University

Silver Prize

National Math Olympiad for Undergraduate Students

Korean Math Society

Non-math major tier for Engineering, Medical, and other Science department students

Award of Highest Academic Honor

For top 1% students in dept.

Yonsei University

Award of Academic Honor

For top 3% students in dept.

Yonsei University

FELLOWSHIPS & GRANTS**ICERM Travel Support***August 2026*

Lodging support for “Partial Differential Equations for Many Particles Systems”

ICERM, Brown University

M&MKT Summer School Travel Support*June 2026*

Lodging support for the 13th Summer School on “Methods and Models of Kinetic Theory” M&MKT

Caltech Y Hummel Gray Award*November 2025*

Travel Award for Graduate Students

Caltech

Simons Laufer Travel Support*August 2025*

Travel support for

“Pathways Workshop: Kinetic Theory & Stochastic Partial Differential Equations” and

“Introductory Workshop: Kinetic Theory & Stochastic Partial Differential Equations” UC Berkeley

CMU Travel Support*June 2025*

Travel support for “Frontiers in Applied Analysis” workshop

Carnegie Mellon University

SIAM Travel Award*May 2025*

Travel support for Dynamical Systems (DS) conference

SIAM

ETH Zurich Conference Travel Support*July 2024*

Travel support for “Modern Perspectives in Applied Mathematics:

Theory and Numerics of PDEs”

ETH Zurich

CIRM Conference Travel Support*June–July 2024*

Travel and lodging support for two workshops:

“Frontiers in Interacting Particle Systems” and

“Mathematical Biology: Collective Behavior and Pattern Formation”

CIRM, Marseille, France

Two-year department Fellowship

CMS departmental fellowship

September 2021 – September 2023

Caltech, CMS

OSE Tutoring Scholarship

Awarded for the successful tutors

Yonsei University, OSE Center

Merit-based Undergraduate/Graduate Scholarship

Domestic, External

Kwanjeong Foundation

Merit-based Undergraduate Scholarship

Domestic, External

Korean Foundation for Advanced Studies (KFAS), SK

Academic Scholarship

Fund & Internal

School Private Fund & Yonsei University

Academic Scholarship

Scholarship for admitted undergraduate students

with exceptional academic achievements (**declined**)**Korea University Business Department****TEACHING EXPERIENCE****TA for ACM 270. Advanced Topics: Particles in Motion—****Mathematical Modelling Across Scales***April 2026 – June 2026*

Instructor: Prof. Kathrin Hellmuth

Caltech

Developed lecture notes and delivered two 1.5-hour lectures on mean-field limits and propagation of chaos; held weekly office hours; developed and graded homework problems.

Graduate Level course

TA for ACM 95/100A. Introductory Methods of Applied Mathematics for the Physical Sciences*January 2026 – March 2026*

Instructor: Prof. Konstantin Zuev

Caltech

Held weekly office hours; graded weekly homework problems and exams.

Undergrad/Graduate Level course

TA for ACM 256. Optimal Transport*January 2025 – March 2025*

Instructor: Prof. Franca Hoffmann and Prof. Ricardo Baptista

Caltech

Held weekly office hours; graded homework problems.

Graduate Level course

TA for ACM 95/100A. Introductory Methods of Applied Mathematics for the Physical Sciences*January 2024 – March 2024*

Instructor: Prof. Franca Hoffmann

Caltech

Held weekly office hours; graded weekly homework problems and exams.

Undergrad/Graduate Level course

TA for CMS/ACM 117. Probability Theory and Stochastic Processes*September 2023 – December 2023*

Instructor: Prof. Joel Tropp

Caltech

Graded weekly homework problems and exams.

Graduate-level course

TA for ACM 105. Functional Analysis*January 2023 – March 2023*

Instructor: Prof. Oscar Leong

Caltech

Delivered two 1.5-hour lectures on the Hahn–Banach theorem and the open mapping and closed graph theorems; held weekly office hours; graded homework problems and exams.

Graduate Level course

**TA for CMS/ACM 117. Probability Theory
and Stochastic Processes***September 2022 – December 2022*

Instructor: Prof. Joel Tropp

Caltech

Held weekly office hours; wrote solutions for problem sets; graded weekly homework problems and exams.

Graduate-level course

Private Tutoring

Tutored single/multi-variable Calculus for a freshman undergraduate

Seoul, Korea

Peer Tutoring

Tutored Analysis 1 for undergraduate peers

OSE center, Yonsei University

Undergraduate Level course

MENTORSHIPSURF student: **Ritvik Teegavarapu***May 2024 - current*

Project Title “Towards Convergence Guarantees for Particle Swarm Optimization”

Caltech

Received Poster Award in SOCAMS, 2025

Now a PhD student in Brown University (starting 2026 Fall)

LEADERSHIP**SIAM Student Chapter***2025 - Current*

President (2025-26)

Committee member (2026-27)

Caltech

Womxn in EAS*2024 - current*

Committee member

Caltech

LANGUAGE SKILLS

- **Programming**

- Python, MATLAB, $\text{\LaTeX}$

- **Languages**

- **Korean** Native

- **English** Fluent

- **French** Intermediate (DELF B1, B2)