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

RESEARCH INTEREST

My research sits at the intersection of applied mathematics, probability, and computation. I'm interested in the theoretical foundations of interacting particle systems and mean-field models, especially as they arise in optimization, sampling, and collective behavior. I work on the analysis and development of particle-based algorithms using tools from stochastic analysis, kinetic theory, and partial differential equations.

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

RESEARCH

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

Nicolai Gerber, Franca Hoffmann, Dohyeon Kim, Urbain Vaes
(preprint) <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
(submitted) <https://arxiv.org/abs/2501.12189> (Jan 2025)

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

Seung-Yeal Ha, Franca Hoffmann, Dohyeon Kim, Wook Yoon
(submitted) <https://arxiv.org/abs/2408.10213> (July 2024)

**Authors listed alphabetically by convention in the field.*

CONFERENCES AND OTHER EVENTS

- Frontiers in Applied Analysis (Upcoming)** *June 2025*
Participant, 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*
Invited 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**SIAM Travel Award***May 2025*

Travel Fund for Dynamical Systems (DS) conference

SIAM

ETH Zurich Conference Travel Support*July 2024*Travel funding 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*September 2021 – September 2023*

CMS departmental fellowship

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 256. Optimal Transport***January 2025 – March 2025*

Instructor: Prof. Franca Hoffmann and Prof. Ricardo Baptista

Caltech

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

Undergrad/Graduate Level course

TA for CMS 117. Probability and Stochastic Process*September 2023 – December 2023*

Instructor: Prof. Joel Tropp

Caltech

Graduate Level course

TA for ACM 105. Functional Analysis

January 2023 – March 2023

Instructor: Prof. Oscar Leong

Caltech

Graduate Level course

TA for CMS 117. Probability and Stochastic Process

September 2022 – December 2022

Instructor: Prof. Joel Tropp

Caltech

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

MENTORSHIP

SURF student: **Ritvik Teegavarapu**

May 2024 - current

Project Title “Towards Convergence Guarantees for Particle Swarm Optimization”

Caltech

Received Poster Award in SOCAMS, 2025

LANGUAGE SKILLS

- **Programming**

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

- **Languages**

- **Korean** Native

- **English** Fluent

- **French** Intermediate

- * DELF B1, B2