

Seung-Yeon Ryoo (유승연, 柳昇延)

Curriculum Vitae

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Education

- **Ph. D. in Mathematics, In Progress.** Sep 2018 - present
Princeton University, New Jersey, USA
- Incidental M. A. awarded June 2019
- **B. Sc. in Mathematics. Graduated *Summa Cum Laude* in 2018.** Mar 2012 - Feb 2018
Seoul National University, Seoul, Korea

Research Interests

- Bi-Lipschitz and snowflake embeddings of metric spaces into Banach spaces.
- Poincaré inequalities on metric spaces.
- Analysis of ordinary differential equations that model synchronization.

Publications

- [13] Vertical versus horizontal inequalities on simply connected nilpotent Lie groups and groups of polynomial growth. Preprint available at <https://arxiv.org/abs/2207.11305>.
- [12] Asymptotic formation and orbital stability of phase-locked states in Kuramoto–Lohe type synchronization models on Lie groups. Preprint available at <https://arxiv.org/abs/2109.14761>.
- [11] Embedding snowflakes of Carnot groups into bounded dimensional Euclidean spaces with optimal distortion. To appear in Analysis & PDE. Preprint available at <https://arxiv.org/abs/2004.07441>.
- [10] Constants of motion for the Lohe model with frustration and its applications to emergent dynamics (with Seung-Yeal Ha, Dohyun Kim and Hansol Park). *Physica D: Nonlinear Phenomena*. **416**, 132781 (2021). Preprint available at <https://arxiv.org/abs/2011.00658>.
- [9] Asymptotic phase-locking dynamics and critical coupling strength for the Kuramoto model (with Seung-Yeal Ha). *Commun. Math. Phys.* **377** 811-857 (2020). Preprint available at <https://arxiv.org/abs/2004.05252>.
- [8] On the relaxation dynamics of Lohe oscillators on some Riemannian manifolds (with Seung-Yeal Ha, Dongnam Ko). *J. Stat. Phys.* **172** 1427-1478 (2018)
- [7] Emergence of partial locking states from the ensemble of Winfree oscillators (with Seung-Yeal Ha, Dongnam Ko, Jinyeong Park). *Quart. Appl. Math.* **75** 39-68 (2017)
- [6] Emergent dynamics of a generalized Lohe model on some class of Lie groups (with Seung-Yeal Ha, Dongnam Ko). *J. Stat. Phys.* **168** 171-207 (2017)
- [5] On the finiteness of collisions and phase-locked states for the Kuramoto model (with Seung-Yeal Ha, Hwa Kil Kim). *J. Stat. Phys.* **163**, 1394-1424 (2016)
- [4] Emergence of phase-locked states for the Kuramoto model in a large coupling regime (with Seung-Yeal Ha, Hwa Kil Kim). *Commun. Math. Sci.* **14** 1073-1091 (2016)
- [3] On the emergence and orbital stability of phase-locked states for the Lohe model (with Seung-Yeal Ha). *J. Stat. Phys.* **163**, 411-439 (2016)
- [2] Emergent dynamics of Winfree oscillators on locally coupled networks (with Seung-Yeal Ha, Dongnam Ko, Jinyeong Park). *J. Differential Equations* **260**, 4203-4236 (2016)

- [1] Emergence of phase-locked states for the Winfree model in a large coupling regime (with Seung-Yeal Ha, Jinyeong Park). *Discrete and Continuous Dynamical Systems* **35**, 3417-3436 (2015)

Teaching and Grading

• Teaching Assistant in Princeton

- MAT 335, Analysis II: Complex Analysis, Fall 2022 (preceptor)
- MAT 325, Analysis I: Fourier Analysis and Partial Differential Equations, Spring 2022 (grader)
- MAT 425, Analysis III: Integration Theory and Hilbert Spaces, Fall 2021 (grader)
- MAT 325, Analysis I: Fourier Analysis and Partial Differential Equations, Spring 2021 (grader)
- MAT 335, Analysis II: Complex Analysis, Fall 2020 (preceptor)
- MAT 325, Analysis I: Fourier Analysis and Partial Differential Equations, Spring 2020 (grader)
- MAT 335, Analysis II: Complex Analysis, Fall 2019 (preceptor)

Honors, Awards, and Fellowships

- **Overseas PhD Scholarship** Sep 2018
Korea Foundation for Advanced Studies
- **Grand Prize - 35th University Students' Contest of Mathematics** Dec 2016
Korean Mathematical Society
- **Undergraduate Scholarship** Sep 2015 - Feb 2018
Korea Foundation for Advanced Studies

Conference Organization

- **Workshop for students in Analysis and PDE, Sogang University, Seoul, Korea.** Jul 2018
Co-organizers: Hyunseok Kim (Sogang Univ.), Hyunwoo Kwon (Sogang Univ), Young-Ran Lee (Sogang Univ.)
Homepage: <https://sites.google.com/view/wsap2018>

Talks

- **Vertical versus horizontal inequalities on nilpotent Lie groups and groups of polynomial growth** Aug 2022
Dynamics seminar, Seoul National University, Seoul, Korea.
- **Vertical versus horizontal inequalities on nilpotent Lie groups and groups of polynomial growth** Aug 2022
Virtual Seminar on Geometry and Topology, Korea Institute for Advanced Studies, Seoul, Korea.
- **Vertical versus horizontal inequalities on nilpotent Lie groups and groups of polynomial growth** Aug 2022
Concentration Week on Geometry and Analysis on Nonsmooth Spaces, Texas A&M University, Texas, USA.
- **A sharp form of the Assouad embedding theorem for Carnot groups** Aug 2022
Graduate Concentration Week on Metric Geometry, Texas A&M University, Texas, USA.
- **Two mathematical models of synchronization** Apr 2022
Program in Applied and Computational Sciences Graduate Student Seminar, Princeton University, New Jersey, USA.
- **Vertical versus horizontal inequalities on Carnot groups via a Dorrnsoro theorem and Littlewood–Paley–Stein theory** Mar 2022
AMS Spring Central Virtual Sectional Meeting, Purdue University, Indiana, USA.
- **Dorrnsoro's theorem and vertical versus horizontal Poincaré inequalities on Carnot groups** Jan 2022
Workshop for Young Mathematicians in Korea, Seoul, Korea.
- **Talagrand's influence inequality revisited** Oct 2021
Discrete Analysis and Complexity of Quantum Algorithms, online.

- May 2021
• **A sharp form of Assouad's embedding theorem for Carnot groups**
Online Asymptotic Geometric Analysis Seminar, online.
- Mar 2021
• **A sharp form of Assouad's embedding theorem for Carnot groups**
AMS Spring Eastern Virtual Sectional Meeting, Brown University, Rhode Island, USA.
- Aug 2020
• **Embedding snowflakes of Carnot groups into bounded dimensional Euclidean spaces with optimal distortion**
HYKE-Hwarang Invited Talk, Seoul National University, Seoul, Korea.
- Feb 2020
• **Embedding metric spaces into ℓ^p**
Undergraduate ("Nullset") colloquium, Princeton University, New Jersey, USA.
- Apr 2019
• **Krivine's theorem and related results**
Graduate Student Seminar, Princeton University, New Jersey, USA.
- Dec 2018
• **Recent developments in the Assouad embedding theorem**
Graduate Student Seminar, Sogang University, Seoul, Korea.
- Jul 2018
• **On the Critical Coupling Strength of the Kuramoto model**
Workshop for students in Analysis and PDE, Sogang University, Seoul, Korea.
- Aug 2017
• **Emergent dynamics of a generalized Lohe model on some class of Lie groups**
Intercollegiate Undergraduate ("Stupid Mathematics") Seminar, Sogang University, Seoul, Korea.
- Aug 2016
• **The Kuramoto model: a paradigm for synchronization**
Intercollegiate Undergraduate ("Stupid Mathematics") Seminar, Sogang University, Seoul, Korea.

Other Experience

- Sep 2013 - Sep 2015
• **Military Service**
Republic of Korea Air Force