Homoon Ryu

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Research Areas

Graph theory, Structural graph theory, Combinatorial Matrix Theory.

I am interested in structures of graphs having specific matrix (e.g. Toeplitz matrix) as its adjacency matrix.

Education

Seoul National University, Seoul, Korea
Ph.D. in Mathematics Education   09/2021 – 02/2025
M.A. in Mathematics Education   09/2019 – 08/2021
B.S. in Mathematics Education   03/2014 – 02/2019
Seoul Science High School, Seoul, Korea   03/2011 – 02/2014

Papers

Preprints

4. Hojin Chu and **Homoon Ryu** "Linear-Time Computation of the Frobenius Normal Form for Symmetric Toeplitz Matrices via Graph-Theoretic Decomposition". Submitted, arXiv:2505.20811.
3. Gi-Sang Cheon, Bumtle Kang, Suh-Ryung Kim, Seyed Ahmad Mojallal, and **Homoon Ryu** "On Toeplitz graphs being line graphs". Submitted, arXiv:2201.05317. 2024.
2. Hojin Chu, Suh-Ryung Kim, and **Homoon Ryu**. "Planarity of generalized ladder graphs". Submitted, arXiv:2208.13637. 2022.
1. Gi-Sang Cheon, Bumtle Kang, Suh-Ryung Kim, and **Homoon Ryu**. "Row graphs of Toeplitz matrices". Submitted, arXiv:2305.02690. 2023.

Published Papers

3. Hojin Chu and **Homoon Ryu**. "Structural properties of symmetric Toeplitz and Hankel matrices". In: *Linear Algebra Appl.*, 708: 204–216, 2025.
2. Gi-Sang Cheon, Bumtle Kang, Suh-Ryung Kim, and **Homoon Ryu**. "Matrix periods and competition periods of Boolean Toeplitz matrices II". In: *Linear Algebra Appl.* 703:27–46, 2024.
1. Gi-Sang Cheon, Bumtle Kang, Suh-Ryung Kim, and **Homoon Ryu**. "Matrix periods and competition periods of Boolean Toeplitz matrices". In: *Linear Algebra Appl.* 672:228–250, 2023.

Research Talks

International

3. The Frobenius normal form of symmetric Toeplitz and Hankel matrices, *Canadian Discrete and Algorithmic Mathematics 2025 (CanaDAM 2025)* (May 20 - 23), University of Ottawa, Ottawa, Canada.
2. Periods of Boolean Toeplitz matrices II, *2023 China-Korea-Japan International Conference on Matrix Theory with Applications(2023 China-Korea-Japan ICMTA)*(December 1–4), University of Nanchang, Nanchang, China.
1. Periods of Boolean Toeplitz matrices, *24th International Linear Algebra Society Conference (ILAS 2022)*(June 20–22), University of Galway, Galway, Ireland.

In Korea

1. How to determine a graph Toeplitz or not?, *2024 Korean Student Combinatorics Workshop (2024 KSCW)*(July 29–August 2), Gongju, Korea.
2. Structural properties of a symmetric Toeplitz matrix, *2024 Korean Mathematics Society Annual Meeting (2024 KMS)*(Oct 24–Oct 26), Sungkyunkwan University, Suwon, Korea.

Teaching

Teaching Assistant

1. **Calculus 1**, Spring 2020, Seoul National University.
2. **Calculus 2**, Fall 2020, Seoul National University.
3. **Abstract Algebra 2**, Fall 2021, Seoul National University.
4. **Abstract Algebra 1**, Spring 2022, Seoul National University.
5. **Abstract Algebra 2**, Fall 2022, Seoul National University.
6. **Abstract Algebra 1**, Spring 2023, Seoul National University.
7. **Combinatorics**, Fall 2023, Seoul National University.
8. **Combinatorial matrix theory**, Spring 2024, Seoul National University.
9. **Linear Algebra 2**, Fall 2024, Seoul National University.

References

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Prof. Jangsoo Kim.
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