

최인혁

이력서/2025년 9월 수정

한국과학기술원부설고등과학원 수학과

서울시 동대문구 회기로 85길, 02455

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연구 관심사

제 연구는 기하위상수학, 기하군론 및 동역학 등에 걸쳐 있습니다. 핵심 키워드는 다음과 같습니다. Teichmüller space, mapping class groups, Outer space, $\text{Out}(F_N)$, Gromov hyperbolic spaces, $\text{CAT}(0)$ spaces, random walks, Patterson-Sullivan theory, growth of groups, percolation in groups, counting problems and growth problems in groups, dynamics of groups acting on Gromov hyperbolic spaces.

경력

08/2025-	KIAS (KAIST부설 고등과학원) KIAS Fellow
07/2024-08/2025	미국 코넬대학교 Harry Kesten Assistant Professor (박사후연구원)
03/2023-06/2024	KIAS (KAIST부설 고등과학원) Project Research Fellow (-07/2023), June E Huh Fellow (08/2023-) 멘토교수: 김상현
03/2024-06/2024	캐나다 필즈 연구소 Marsden 박사후연구원 프로그램 ("Thematic program on Randomness and Geometry" 참가) 멘토교수: Giulio Tiozzo

학력

09/2018-02/2023	KAIST 수리과학과 박사 지도교수: 백형렬
03/2015-08/2018	KAIST 물리학, 수리과학 및 생명과학 학사 최우등 졸업

기타 경력

07/2024-08/2025	고등과학원 허준이수학난제연구소 Visiting fellow
12/2018-02/2019	Tokyo Institute of Technology 방문
08/2017-02/2018	École Polytechnique Fédérale de Lausanne 방문
12/2015-06/2017	KAIST Biomedical Optics Lab 학사연구원 지도교수: 박용근
06/2015-08/2015	University of California, Berkeley 방문

수상

02/2023	KAIST 수리과학과 2023학년도 학위논문상
08/2022	KAIST 수리과학과 2022학년도 봄학기 우수조교상
03/2017	KAIST 자연과학대학 2016학년도 가을학기 Dean's list
12/2016	전국 대학생수학경시대회 은상
03/2015–08/2018	대통령과학장학생
03/2015–08/2018	KAIST 총장 장학생

논문

1. Percolation in acylindrically hyperbolic groups
With *Donggyun Seo*.
Preprint (2025), draft.
2. Metric weak proper discontinuity for pseudo-Anosov maps
Preprint (2025), arXiv:2506.21214.
3. Acylindrically hyperbolic groups and counting problems
Preprint (2025), arXiv:2504.20985.
4. 원의 위상동형사상 군의 자유군과 Tits 대안 (Pivoting technique for the circle homeomorphism group)
Preprint (2025), 일부 번역: arXiv:2504.02788.
5. Smoothing countable group actions on metrizable spaces
With *Sang-hyun Kim*.
Preprint (2024), **Proceedings of the Mathematical Society of Japan, Seasonal Institute**에 게재 예정. arXiv:2410.06077.
6. Counting pseudo-Anosovs as weakly contracting isometries
Inventiones Mathematicae, Vol. 242, pp. 337–386 (2025). <https://doi.org/10.1007/s00222-025-01358-5>, arXiv:2408.00603.
7. Confined subgroups in groups with contracting elements
With *Ilya Gekhtman, Wenyan Yang and Tianyi Zheng*.
Preprint (2024). arXiv:2405.09070.
8. Contracting isometries and differentiability of the escape rate
Preprint (2024). arXiv:2403.09992.
9. Random walks on groups and superlinear divergent geodesics
With *Kunal Chawla, Vivian He and Kasra Rafi*.
Ergodic Theory and Dynamical Systems, Vol. 45, no. 5, pp. 1403–1443 (2025). <https://doi.org/10.1017/etds.2024.75>, arXiv:2310.18506.
10. Genericity of contracting geodesics in groups
With *Kunal Chawla and Giulio Tiozzo*.
Preprint (2023). **Groups, Geometry, and Dynamics**에 게재 예정. arXiv:2308.01877.
11. Random walks and contracting elements III: Outer space and outer automorphism group
Preprint (2023). arXiv:2212.12122.
12. Random walks and contracting elements II: Translation lengths and quasi-isometric embedding
Preprint (2023). **Groups, Geometry, and Dynamics** 온라인 사전 게재, <https://doi.org/10.4171/ggd/831>.
13. Random walks and contracting elements I: Deviation inequality and limit laws
Preprint (2023). arXiv:2207.06597. **Compositio Mathematica**에 게재 예정.

14. Random walks on mapping class groups (survey paper)
With *Hyungryul Baik*.
EMS Surveys in Mathematical Sciences, 9 (2022), no. 2, pp. 279–320. <https://doi.org/10.4171/EMSS/59>.
15. Pseudo-Anosovs are exponentially generic in mapping class groups
Geometry & Topology, Vol. 28, pp. 1923–1955. (2024) <https://doi.org/10.2140/gt.2024.28.1923>.
16. Central limit theorem and geodesic tracking on hyperbolic spaces and Teichmüller spaces
Advances in Mathematics, Vol. 431, 109236 (2023). <https://doi.org/10.1016/j.aim.2023.109236>.
17. Linear growth of translation lengths of random isometries on Gromov hyperbolic spaces and Teichmüller spaces
With *Hyungryul Baik and Dongryul M. Kim*.
Journal of the Institute of Mathematics of Jussieu, Vol. 23, no. 4, pp. 1751–1795. <https://doi.org/10.1017/S1474748023000373>.
18. Simple length spectra as moduli for hyperbolic surfaces and rigidity of length identities
With *Hyungryul Baik and Dongryul M. Kim*. **Annales de l'Institut Fourier**에 게재 예정.
Preprint (2020). arXiv:2012.05652.
19. On the surjectivity of the Symplectic representation of the mapping class group
With *Hyungryul Baik and Dongryul M. Kim*.
Topology and its Applications, Vol. 322, 108334 (2022). <https://doi.org/10.1016/j.topol.2022.108334>.
20. Topological entropy of pseudo-Anosov maps from a typical Thurston construction
With *Hyungryul Baik and Dongryul M. Kim*.
International Mathematics Research Notices, Vol. 2022, No. 24, pp. 19762–19904. (2022) <https://doi.org/10.1093/imrn/rnab167>
21. Inhyeok Choi, KyeoReh Lee, and YongKeun Park. Compensation of aberration and speckle noise in quantitative phase imaging using lateral shifting and spiral phase integration. **Optics Express**, 25(24) pp. 30771–30779 (2017).

연구 발표

강연 시리즈

- 2023.07.29. Growth of (sub)groups with hyperbolicity. (강연 3회 및 1주일간 그룹 토의 진행)
Geometry in Groups 2024. TIFR-ICTS, Bangalore, India.
- 2024.05.03. Hyperbolicity of geodesics, counting and random walks. (강연 4회) *Riverside Workshop on Geometric Group Theory 2024, UC Riverside.*

초청 발표

- 2025.08.27. Many infinite clusters from percolation in many groups. *KIAS-KAIST Workshop on current challenges in mathematics. KIAS, South Korea.*
- 2025.08.18. Metric WPD of pseudo-Anosov maps and quasimorphisms. *Algebraic and analytic methods in group theory in Warsaw. IMPAN, Warsaw, Poland.*
- 2025.08.06. Dynamics of semigroups of circle homeomorphisms. *One-day Festival of Group actions, Geometry and Dynamics. KIAS, South Korea.*
- 2025.06.16. Genericity problem in groups with negative curvature. *Geometric Group Theory and Related Topics. BICMR, Peking University, China.*

- 2025.05.19. Counting pseudo-Anosovs and fully irreducibles. *53rd Barrett Lectures: Recent Development in Geometric Group Theory*. TN, USA.
- 2025.04.15. Genericity of pseudo-Anosovs and quasi-isometries. *Stanford Topology Seminar*. CA, USA.
- 2025.04.01. Genericity of pseudo-Anosovs and quasi-isometries. *Geometry & Topology Seminar*. Rutgers New Brunswick, NJ, USA.
- 2025.03.14. Dynamics of semigroups of circle homeomorphisms. *The Scottish Dynamics Network*. Heriot-Watt University, Edinburgh, UK.
- 2025.03.12. Genericity of pseudo-Anosovs and quasi-isometries. *Algebra, Geometry, and Topology Seminar*. Heriot-Watt University, Edinburgh, UK.
- 2025.03.06. Genericity of pseudo-Anosovs and quasi-isometries. *Binghamton Geometry & Topology Seminar*. NY, USA.
- 2025.02.14. Genericity of pseudo-Anosovs and quasi-isometries. *SUNY at Buffalo Geometry & Topology Seminar*. NY, USA.
- 2024.01.16. Free discrete subgroups of $\text{Homeo}(S)$ and the fine curve graph. *Virtual Seminar in Geometry and Topology (VISGAT)*, *고등과학원*.
- 2024.12.03. Metric WPD for $\text{Homeo}(S)$: loxodromics on the fine curve graph. *KAIST 위상수학 세미나*.
- 2024.11.28. Metric WPD for $\text{Homeo}(S)$: loxodromics on the fine curve graph. *Hyperbolic Lunch*, *University of Toronto*.
- 2024.10.22. Genericity of pseudo-Anosovs and quasi-isometries. *CUNY Geometry & Topology Seminar*, *CUNY*.
- 2024.09.24. Genericity of pseudo-Anosovs and quasi-isometries. *KIAS-Rice Workshop on Geometric Topology*, *고등과학원 허준이수학난제연구소*.
- 2024.09.05. Genericity of pseudo-Anosovs and quasi-isometries. *Cornell Dynamics Seminar*. (예정)
- 2024.06.25. Sullivan's conjecture, Myrberg limit set and Hausdorff dimension. *One day workshop with Young Geometric Topologists at KAIST*.
- 2024.05.13. Continuity of escape rate of random walks on $\text{CAT}(0)$ spaces. *Dynamics of group actions and random walks on groups*, *Fields Institute*.
- 2024.04.21. Confined subgroups and their growth. *Alfréd Rényi Institute*. Budapest, Hungary.
- 2024.04.08. Genericity of pseudo-Anosov mapping classes. *Young Geometric Group Theory XII*, *Bristol, UK*.
- 2024.04.04. Genericity of pseudo-Anosovs (and fully irreducibles). *Princeton Topology Seminar*, *Princeton University*.
- 2024.04.02. Genericity of pseudo-Anosov mapping classes. *Brandeis Topology Seminar*, *Brandeis University*.
- 2024.03.20. Random walks, superlinear divergence and quasi-isometry. *UBC Probability Seminar*, *University of British Columbia*.
- 2024.03.15. Growth of normal subgroups of a hyperbolic group. *GT GAPS Seminar*. (Online)
- 2024.02.29. Normal subgroups, confined subgroups and growth. *Korea-France Workshop on Dynamical Group Theory*, *고등과학원*.
- 2024.01.17. Regularity of the escape rate and the asymptotic entropy of a random walk. *KAIST GT Fair 2024*, *부산*.
- 2023.11.03. Genericity of contracting elements in groups. *서울대학교 Rookies Workshop 2023*, *양평*.
- 2023.10.28. Generic mapping classes are pseudo-Anosov. *2023 대한수학회 가을 발표회*, *서울대학교*.
- 2023.10.05. Genericity of contracting elements in groups. *Tokyo-Seoul Conference in Mathematics 2023*, *The University of Tokyo*.
- 2023.09.11. Random walks on groups without an action on hyperbolic spaces. *Topology seminar*, *KAIST*.

- 2023.09.04. Genericity of contracting elements in groups. *World of GroupCraft III*. (Online)
- 2023.08.21. Genericity of contracting elements in groups. *The 4th Korea-France Conference in Mathematics*, *고등과학원*.
- 2023.07.14. Geometry and dynamics of a finitely generated group. *Workshop on Quantum Analysis 2023*, *속초*.
- 2023.04.20. Random walks on non-positively curved spaces: rate of escape, CLT and large deviation principle. *Conference on Probability and PDE*, *KAIST*.
- 2023.04.06. Counting pseudo-Anosov mapping classes. (a series of 4 talks) *Virtual Seminar on Geometry and Topology*, *고등과학원*.
- 2023.02.09. Asymmetry of a generic outer automorphism of a free group. *The 18th East Asian Conference on Geometric Topology*. (온라인)
- 2022.11.08. Random subgroup is quasi-isometrically embedded. *Geometry and Topology Seminar*, *CUNY*.
- 2022.11.08. The log-regularity of the hitting measure on the Gromov boundary. *Group actions, Geometry and Dynamics Seminar*, *Yale University*.
- 2022.11.02. Asymmetry of a typical outer automorphism. *Geometry and Topology Seminar*, *Temple university*.
- 2022.10.27. Simple length spectrum of a hyperbolic surface. *Hyperbolic lunch*, *University of Toronto*.
- 2022.10.24. Mapping class group, Teichmüller space and Bers' proof of Nielsen-Thurston's classification. *Dynamics Seminar*, *University of Toronto*.
- 2022.05.12. Typical behavior of random mapping classes and outer automorphisms. *Fudan Topology Seminar*. (온라인)
- 2022.04.11. Limit laws beyond hyperbolic spaces. *AIM Workshop "Random walks beyond hyperbolic groups"*.
- 2021.12.03. Limit laws for random walks on mapping class groups. *Conformal Dynamics and Groups Seminar*, *BICMR*. (온라인)
- 2021.11.29. Random walks on mapping class groups favor pseudo-Anosovs. *Dynamics Seminar*, *University of Toronto*. (온라인)
- 2021.11.18. Random walks, counting problems and genericity of loxodromics. *Geometry and Topology Seminar*, *Technion*. (온라인)
- 2021.10.06. Random walks on Gromov hyperbolic spaces and Teichmüller spaces. *Tokyo Tech Topology Seminar*. (온라인)
- 2021.07.22. Random walks on Gromov hyperbolic spaces and Teichmüller spaces. *Pacific Dynamics Seminar*. (온라인)
- 2021.02.03. Simple length spectra of a generic hyperbolic surface determine its isometry class. *Virtual Seminar on Geometry and Topology*. (온라인)

참가 발표

- 2022.05.31. Frequently contracting geodesics and random mapping class. *PK2 Topology Workshop*.
- 2022.04.25. Limit laws and their consequences on MCG and $\text{Out}(Fn)$. 5-min lightning talk, *IHP Conference "Mapping Class Groups and $\text{Out}(Fn)$ "*.
- 2022.01.18. Random mapping classes are pseudo-Anosov. *The 17th East Asian Conference on Geometric Topology*. (온라인)
- 2021.01.26. Rigidity of length Identities of hyperbolic surfaces. *The 16th East Asian Conference on Geometric Topology*. (온라인)
- 2020.10.30. Random walks and mapping class groups. 10-minute talk at *Geometric Group Theory in East Asia*. (온라인)

학회 조직

- 2026.06.07. Young Geometric Group Theory (yGGT) XIV, KIAS (공동조직: Giovanni Italiano (Oxford), Annette Karrer (Ohio State), 곽상훈 (서울대학교))
- 2025.08.29. 2025 2K-GATE One day Geometric Topology Festival (공동조직위원: 김상현 (고등과학원), 백형렬 (KAIST))
- 2023.12.18–20. Hyperbolic Geometry of Numbers, 고등과학원 (공동조직: 김상현 (고등과학원), Ser Peow Tan (NUS))
- 2023.09.27–28. The 1st Korea-Chile Workshop on Dynamical Group Theory, 인천 (공동조직: 김상현 (고등과학원))

교육

코넬대학교

- 2025 봄 MATH 3040 Prove It! 강의
2024 가을 MATH 1110 Calculus I 강의

KAIST

- 2022 가을 MAS102 미적분학 II & MAS430 조합적 위상수학 조교
2022 봄 MAS109 선형대수학개론, MAS201 응용미분방정식 조교
2021 가을 MAS201 응용미분방정식, MAS441 르베그적분론 조교
2021 봄 MAS109 선형대수학개론, MAS331 위상수학 조교
2020 가을 MAS102 미적분학 II, MAS441 르베그적분론 조교
2020 봄 MAS201 응용미분방정식 총괄조교
2019 가을 MAS201 응용미분방정식, MAS441 르베그적분론 조교
2019 봄 MAS201 응용미분방정식, MAS331 위상수학 조교
2018 가을 MAS355 수리통계학 조교
2017 봄, 2018 봄 MAS101 미적분학 I 학부생조교

봉사 및 대외활동

- 다음에 심사 의견 제출: *Advances in Mathematics*, *Annales Henri Lebesgue*, *Annales de l'IHP (B)*, *Compositio Mathematica*, *Forum of Mathematics*, *Sigma* (quick opinion), *Israel Journal of Mathematics*, *Journal of Topology*, *Journal of Topology and Analysis*, *Memoirs of the EMS*, *MathSciNet Mathematical Reviews*.
- Cornell Topology Seminar 주관: 2024학년도 가을학기 및 2025학년도 봄학기