Sepehr Hajebi

Curriculum Vitæ (updated on November 20, 2023)

Contact

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Education

PhD in Mathematics (Combinatorics and Optimization)
University of Waterloo, Waterloo, Ontario, Canada
Fall 2020 – (expect to graduate in Spring 2024)
Thesis: Dichotomy theorems for treewidth and induced subgraphs
Advisor: Sophie Spirkl

BSc and MSc in Mathematics
Isfahan University of Technology, Isfahan, Iran
Fall 2012 – Spring 2019

Awards

7. **Sinclair Graduate Scholarship**, 1900+ε CAD
   Department of Combinatorics and Optimization, University of Waterloo (Fall 2023)
6. **Outstanding TA Award**
   Department of Combinatorics and Optimization, University of Waterloo (Winter 2022)
5. **Visiting Korean Mathematical Society (KMS), Korea Institute for Advanced Studies (KIAS), and National Institute for Mathematical Sciences (NIMS)**
   Invited and funded by The Embassy of South Korea in Iran (Fall 2016)
4. **Korean Mathematical Society Contest for University Students**
   Seoul, South Korea – Third Prize (Fall 2016)
3. **International Mathematics Competition for University Students (IMC)**
   Blagoevgrad, Bulgaria – Third Prize (Spring 2015 and 2016)
2. **Iranian Mathematical Society Competition for University Students**
   Second and Third Prize (Spring 2015 and 2016)
1. **IUT Elite Student Award**
   Isfahan University of Technology (2016 and 2018)

Research Interests

Broadly: Discrete math, especially structural, extremal and algorithmic graph theory, and combinatorial optimization

Currently: Induced subgraphs, graph minor theory, and their interconnection.

Papers

All manuscripts available at http://arxiv.org/a/hajebi_s_1.

Published:

23. **Induced subgraphs and tree decompositions VII. Basic obstructions in H-free graphs**
    J. Comb. Theory Ser. B 164 (2024)
    with T. Abrishamin, B. Alecu, M. Chudnovsky and S. Spirkl.

22. **Induced subgraphs and tree decompositions**
II. Toward walls and their line graphs in graphs of bounded degree
J. Comb. Theory Ser. B 164 (2024)
with T. Abrishami, M. Chudnovsky, C. Dibek, P. Rzążewski, S. Spirkl and K. Vušković.

21. **Induced subgraphs and tree decompositions**
IV. (Even hole, diamond, pyramid)-free graphs
Electron. J. Comb 30(2) (2023)
with T. Abrishami, M. Chudnovsky and S. Spirkl.

20. **Induced subgraphs and tree decompositions**
III. Three-path-configurations and logarithmic treewidth
Advances in Combinatorics (6) (2022)
with T. Abrishami, M. Chudnovsky and S. Spirkl.

19. **Complexity dichotomy for List-5-Coloring with a forbidden induced subgraph**
SIAM J. Discrete Math 256(6) (2022)
with Y. Li and S. Spirkl.

18. **Minimal induced subgraphs of two classes of 2-connected non-Hamiltonian graphs**
Discrete Math. 345(7) (2022)
with J. Cheriyan, Z. Qu and S. Spirkl.

17. **Edge clique cover of claw-free graphs**
J. Graph Theory 90(3) (2019)
with R. Javadi.

Accepted or in revision:

16. **Hitting all maximum stable sets in P_5-free graphs**
J. Comb. Theory Ser. B (accepted)
with Y. Li and S. Spirkl (2023)

15. **List-3-Coloring ordered graphs with a forbidden induced subgraph**
SIAM J. Discrete Math (accepted)
with Y. Li and S. Spirkl (2023)

14. **Induced subgraphs and tree decompositions**
V. One neighbor in a hole
J. Graph Theory (accepted)
with T. Abrishami, B. Alecu, M. Chudnovsky, S. Spirkl and K. Vušković (2022)

13. **Induced subgraphs and tree decompositions**
VIII. Excluding a forest in (theta, prism)-free graphs
Combinatorica (in revision)
with T. Abrishami, B. Alecu, M. Chudnovsky and S. Spirkl (2023)

Submitted:

12. **List-k-Coloring H-free graphs for all $k > 4$**
with M. Chudnovsky and S. Spirkl (2023)

11. **Induced subgraphs and tree decompositions**
XIV. Non-adjacent neighbors in a hole
with M. Chudnovsky and S. Spirkl (2023)

10. **Induced subgraphs and tree decompositions**
XIII. Basic obstruction in $\mathcal{H}$-free graphs for finite $\mathcal{H}$
with B. Alecu, M. Chudnovsky and S. Spirkl (2023)

9. **Induced subgraphs and tree decompositions**
   XII. Grid Theorem for pinched graphs
   with B. Alecu, M. Chudnovsky and S. Spirkl (2023)
8. **Induced subgraphs and tree decompositions**
   XI. Local strcture for even-hole-free graphs of large treewidth
   with B. Alecu, M. Chudnovsky and S. Spirkl (2023)
7. **Induced subdivisions with pinned branch vertices**
   solo paper (2023)
6. **Induced subgraphs and tree decompositions**
   X. Towards logarithmic treewidth for even-hole-free graphs
   with T. Abrishami, B. Alecu, M. Chudnovsky and S. Spirkl (2023)
5. **Tree independence number for (even hole, diamond, pyramid)-free graphs**
   with T. Abrishami, B. Alecu, M. Chudnovsky, S. Spirkl and K. Vušković (2023)
4. **Induced subgraphs and tree decompositions**
   IX. Grid theorem for perforated graphs
   with B. Alecu, M. Chudnovsky and S. Spirkl (2023)
3. **Induced subgraphs and tree decompositions**
   VI. Graphs with 2-cutsets
   with T. Abrishamin, B. Alecu, M. Chudnovsky and S. Spirkl (2022)

Upcoming:

2. **Chordal graphs, even-hole-free graphs and sparse obstructions to bounded treewidth**
   solo paper.
1. **Certification for H-free graphs and beyond.**
   with Nicolas Bousquest, Aristotelis Chaniotis, Linda Cook, S. Spirkl, Pierron Théo and Sébastien Zeitoun.

Talks

Upcoming:

7. **Treewidth, Erdős-Posá and induced subgraphs** [invited]
   New York Combinatorics Seminar (Dec 8, 2023)
6. **Several Gyárfás-Sumner-type results for treewidth** [invited]
   Graphs and Matroids Seminar, University of Waterloo, Canada (Nov 23, 2023)

Past:

5. **Hitting all maximum stable sets in P_5-free graphs** [invited]
   Graphs and Matroids Seminar, University of Waterloo, Canada (Feb 6, 2023)
4. **Forests in even-hole-free graphs of large treewidth** [invited]
   Barbados Graph Theory Workshop, Bellairs Research Institute of McGill University, Barbados (Dec 12, 2022)
3. **Holes, hubs, and bounded treewidth** [invited]
   IBS Virtual Discrete Math Colloquium, Daejeon, South Korea (July 7, 2022)
2. **Bounded treewidth in hereditary graph classes** [invited]
   Graphs and Matroids Seminar, University of Waterloo, Canada (July 5, 2022)
1. **Bounded treewidth in hereditary graph classes** [invited]
   Seymour is 70, ENS de Lyon, France (June 22, 2022)

Mentoring
Teaching
Service

Undergraduate mentorship at University of Waterloo:

Directed Reading Program (DRP)
Women in Math (WiM) committee (Fall 2023)
Project: Introduction to graph minor theory
Mentees: Xinyue Fan and Lyncy Li

Undergraduate Research Assistant Program (URA)
Department of Combinatorics and Optimization (Spring 2023)
Project: Maximum transitive set in H-free tournaments
Mentee: Yun Xing

TA at University of Waterloo:

22. **CO456 Game theory,** instructed by Martin Pei (Fall 2023)
21. **CO250 Introduction to optimization,** instructed by Jane Gao, David Jao and Walaa Morsi (Fall 2023)
20. **CO342 Graph Theory,** instructed by Peter Nelson (Spring 2023)
19. **MATH138 Calculus II for honors of mathematics,** various instructors (Winter 2023)
18. **CO250 Introduction to optimization,** instructed by Henry Wolkowicz, Jorn van der Pol, David Aleman Espinosa, Martin Pei (Winter 2023)
17. **MATH600 Mathematical software,** instructed by Sarah Chan (Fall 2022)
16. **CO456 Game theory,** instructed by David Jao (Fall 2022)
15. **CO380 Mathematical discovery and invention,** instructed by Logan Crew (Spring 2022)
14. **MATH239 Introduction to combinatorics,** instructed by Jane Gao, Debbie Leung and Kanstantsin Pashkovich (Winter 2022)
13. **CO255 Advanced optimization,** instructed by Bill Cook (Winter 2022)
12. **CO250 Introduction to optimization,** instructed by Levent Tuncel and Kanstantin Pashkovich (Fall 2021)
11. **CO450/650 Graph theory (graduate),** instructed by Luke Postle (Fall 2021)
10. **CO351 Network-flow theory,** instructed by Joseph Cheriyan (Spring 2021)

TA at Isfahan University of Technology:

9. **Computational complexity (graduate),** instructed by Ramin Javadi (2019).
8. **Elements of matrics and linear algebra,** instructed by Ramin Javadi (2018).
7. **Applied Linear algebra for engineering,** instructed by Ramin Javadi (2018).
6. **Graph theory (graduate),** instructed by Ramin Javadi (2017).
5. **Elements of combinatorics,** instructed by Ramin Javadi (2017)
4. **Graph theory,** instructed by Behnaz Omoomi (2016).
3. **Elements of combinatorics,** instructed by Gholamreza Omidi (2016).
2. **Graph theory (graduate),** instructed by Behnaz Omoomi (2014)
1. **Elements of combinatorics,** instructed by Ramin Javadi (2014)

Refereeing for journals and conference proceedings:

- International Mathematics Research Notices (IMRN)
- J. Comb. Theory Ser. B (JCTB)
- European Journal of Combinatorics
- J. Graph Theory (JGT)
- Electronic Journal of Combinatorics
- European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB)
- Workshop on Graphs (WG)