Sepehr Hajebi

Curriculum Vitæ (updated on October 26, 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

1. **Sinclair Graduate Scholarship**, 1900 CAD
   Department of Combinatorics and Optimization, University of Waterloo (Fall 2023)
2. **Outstanding TA Award**
   Department of Combinatorics and Optimization, University of Waterloo (Winter 2022)
3. **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)
5. **International Mathematics Competition for University Students (IMC)**
   Blagoevgrad, Bulgaria – Third Prize (Spring 2015 and 2016)
6. **Iranian Mathematical Society Competition for University Students**
   Second and Third Prize (Spring 2015 and 2016)
7. **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.

Accepted or in revision:

1. **Induced subgraphs and tree decompositions VII. Basic obstructions in H-free graphs**
   J. Comb. Theory Ser. B (accepted)
   with Tara Abrishamin, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)

2. **Induced subgraphs and tree decompositions**
VIII. Excluding a forest in (theta, prism)-free graphs
Combinatorica (in revision)
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)

3. **Induced subgraphs and tree decompositions**
II. Toward walls and their line graphs in graphs of bounded degree
J. Comb. Theory Ser. B (accepted)
with Tara Abrishami, Maria Chudnovsky, Cemil Dibek, Paweł Rzążewski, Sophie Spirkl and Kristina Vušković (2021)

4. **Induced subgraphs and tree decompositions**
V. One neighbor in a hole
J. Graph Theory (accepted)
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky, Sophie Spirkl and Kristina Vuskovic (2022)

5. **Hitting all maximum stable sets in P_5-free graphs**
J. Comb. Theory Ser. B (in revision)
with Yanjia Li and Sophie Spirkl (2023)

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

Published:

7. **Induced subgraphs and tree decompositions**
IV. (Even hole, diamond, pyramid)-free graphs
Electron. J. Comb 30(2)
with Tara Abrishami, Maria Chudnovsky and Sophie Spirkl (2023)

8. **Induced subgraphs and tree decompositions**
III. Three-path-configurations and logarithmic treewidth
Advances in Combinatorics (6)
with Tara Abrishami, Maria Chudnovsky and Sophie Spirkl (2022)

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

10. **Minimal induced subgraphs of two classes of 2-connected non-Hamiltonian graphs**
Discrete Math. 345(7)
with Joseph Cheriyan, Zishen Qu and Sophie Spirkl (2022)

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

Submitted:

12. **Induced subgraphs and tree decompositions**
XII. Grid Theorem for pinched graphs
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)

13. **Induced subgraphs and tree decompositions**
XI. Local strcture for even-hole-free graphs of large treewidth
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)

14. **Induced subdivisions with pinned branch vertices** (2023)

15. **Induced subgraphs and tree decompositions**
X. Towards logarithmic treewidth for even-hole-free graphs
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
16. **Tree independence number for (even hole, diamond, pyramid)-free graphs**
with Tara Abrishami, Bogdan Alecu, Maria Chudnovsky, Sophie Spirkl and Kristina Vušković (2023)
17. **Induced subgraphs and tree decompositions**
IX. Grid theorem for perforated graphs
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2023)
18. **Induced subgraphs and tree decompositions**
VI. Graphs with 2-cutsets
with Tara Abrishamin, Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl (2022)

Upcoming:

19. **Induced subgraphs and tree decompositions**
XIII. Basic obstruction in $\mathcal{H}$-free graphs for finite $\mathcal{H}$
with Bogdan Alecu, Maria Chudnovsky and Sophie Spirkl.
20. **Induced subgraphs and tree decompositions**
XIV. Two neighbors in a hole
with Maria Chudnovsky and Sophie Spirkl.
21. **Chordal graphs, even-hole-free graphs and sparse obstructions to bounded treewidth.**
22. **List-k-Coloring H-free graphs for all $k \geq 5$**
with Maria Chudnovsky and Sophie Spirkl
23. **Proof labelling schemes for forbidden induced subgraphs**
with Aristotelis Chaniotis, Linda Cook and Sophie Spirkl

Talks

Upcoming:

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

Past:

3. **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)
5. **Holes, hubs, and bounded treewidth** [invited]
IBS Virtual Discrete Math Colloquium, Daejeon, South Korea (July 7, 2022)
6. **Bounded treewidth in hereditary graph classes** [invited]
Graphs and Matroids Seminar, University of Waterloo, Canada (July 5, 2022)

7. **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:

1. **Directed Reading Program (DRP)**
   Women in Math (WiM) committee (Fall 2023)
   Project: Introduction to graph minor theory
   Mentees: Xinyue Fan and Lyncy Li
2. **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:

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

TA at Isfahan University of Technology:

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

8. **Graph theory (graduate),** instructed by Behnaz Omoomi (2014)
9. **Elements of combinatorics,** instructed by Ramin Javadi (2014)

Refereeing for journals and conference proceedings:

1. International Mathematics Research Notices (IMRN)
2. J. Comb. Theory Ser. B (JCTB)
3. European Journal of Combinatorics
4. J. Graph Theory (JGT)
5. Electronic Journal of Combinatorics
6. European Conference on Combinatorics, Graph Theory and Applications (EUROCOMB)
7. Workshop on Graphs (WG)