

Curriculum vitae of Martin Balko

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Research interests

Discrete geometry.

Graph theory and combinatorics.

Ramsey theory.

Education and employment

Secondary education (2003-2007) — Gymnázium Žatec

Faculty of Mathematics and Physics, Charles University in Prague,

2007–2010 — bachelor's degree (Bc.)

study programme *Computer Science*, branch of study *General Computer Science*

bachelor's thesis *Dots and Boxes implementation*

supervisor RNDr. Ondřej Pangrác, Ph.D.

2010–2012 — master's degree (Mgr.), Cum Laude

study programme *Computer Science*, branch of study *Discrete Models and Algorithms*

diploma thesis *Grid Representations and the Chromatic Number*

supervisor doc. RNDr. Pavel Valtr, Dr.

2012–2016 — doctoral degree (Ph.D.)

study programme *Computer Science*, branch of study *Discrete Models and Algorithms*

dissertation thesis *Ramsey-type results for ordered hypergraphs*

advisor doc. RNDr. Pavel Valtr, Dr.

Excellence scholarship: 2010/2011, 2011/2012

2013–now — part-time researcher at the Institute of Theoretical Computer Science, Prague

2016–now — postdoctoral researcher at the Alfréd Rényi Institute of Mathematics, Hungarian Academy of Sciences, Budapest

Miscellaneous achievements

First prize in the competition *SVOČ 2011*, category Graph Theory and Combinatorics

First prize in the competition *SVOČ 2012*, category Theoretical Computer Science

The paper "Drawing graphs using a small number of obstacles" (M. Balko, J. Cibulka, P. Valtr) was awarded *Best paper in Track 1* at the conference "23rd International Symposium on Graph Drawing & Network Visualization".

Prize of Jirka Matoušek, awarded 21.12.2015.

Publications and manuscripts

1. Oswin Aichholzer, Martin Balko, Thomas Hackl, Jan Kynčl, Irene Parada, Manfred Scheucher, Birgit Vogtenhuber, and Pavel Valtr. A superlinear lower bound on the number of 5-holes, to appear in the *Proceedings of the 33rd International Symposium on Computational Geometry (SoCG 2017)*.
2. Martin Balko, Josef Cibulka, and Pavel Valtr. Covering lattice points by subspaces and counting point-hyperplane incidences, to appear in the *Proceedings of the 33rd International Symposium on Computational Geometry (SoCG 2017)*.
3. Oswin Aichholzer, Martin Balko, Thomas Hackl, Alexander Pilz, P. Ramos, Birgit Vogtenhuber, and Pavel Valtr. Holes in 2-convex sets, in preparation.
Extended abstract in the *32th European Workshop on Computational Geometry (EuroCG 2016)*, 263–266, 2016.
4. Martin Balko, Vít Jelínek, and Pavel Valtr. On ordered Ramsey numbers of bounded-degree graphs, submitted, <https://arxiv.org/abs/1606.05628>.
5. Martin Balko, Josef Cibulka, and Pavel Valtr. Drawing graphs using a small number of obstacles, submitted, <https://arxiv.org/abs/1610.04741>.
Extended abstract in the *Proceedings of 23rd International Symposium on Graph Drawing & Network Visualization (Graph Drawing 2015)*, Lecture Notes in Computer Science, 360–372, 2015.
6. Martin Balko and Jan Kynčl. Bounding the pseudolinear crossing number of K_n via simulated annealing, in preparation.
Extended abstract in the (informal) *Proceedings of the XVI Spanish Meeting on Computational Geometry*, 37–40, 2015.
7. Martin Balko and Pavel Valtr. A SAT attack on the Erdős–Szekeres conjecture, to appear in *European Journal of Combinatorics*.
Extended abstract in *Electronic Notes in Discrete Mathematics* 49, 425–431 2015.
8. Martin Balko, Vít Jelínek, Pavel Valtr, and Bartosz Walczak. On the Beer index of convexity and its variants, *Discrete and Computational Geometry* 57(1), 179–214, 2017.
Extended abstract in the *Proceedings of the 31st International Symposium on Computational Geometry (SoCG 2015)*, Leibniz International Proceedings in Informatics (LIPIcs) 34, 406–420, 2015.
9. Martin Balko, Josef Cibulka, Karel Král, and Jan Kynčl. Ramsey Numbers of Ordered Graphs, submitted, <http://arxiv.org/abs/1310.7208>.
Extended abstract in *Electronic Notes in Discrete Mathematics* 49, 419–424, 2015.
10. Martin Balko, Radoslav Fulek, and Jan Kynčl. Crossing Numbers and Combinatorial Characterization of Monotone Drawings of K_n , *Discrete and Computational Geometry* 53(1), 107–143, 2015.
Extended abstract in (informal) *Proceedings of the XV Spanish Meeting on Computational Geometry*, 2013, 127–130, 2013.
11. Martin Balko, Pavel Klavík, and Yota Otachi. Bounded Representations of Interval and Proper Interval Graphs, *Lecture Notes in Computer Science*, ISAAC 8283, 535–546, 2013.
12. Martin Balko. Grid Representations and the Chromatic Number, *Computational Geometry* 46(8), 990–1002, 2013.
Extended abstract in *28th European Workshop on Computational Geometry EuroCG '12*, 45–48, 2012.
Extended abstract in *Proceedings of the 12th International Symposium on Graph Drawing (Graph Drawing 2012)*, Lecture Notes in Computer Science 7704, 315–323, 2012.

Talks

Conference talks:

SIAM conference on discrete mathematics, Atlanta, USA, 9.6.2016. Contributed talk *On ordered Ramsey numbers of bounded-degree graphs*.

Discrete geometry days, Budapest, Hungary, 21.6.2016. Contributed talk *On the Beer index of convexity and its variants*.

23rd International Symposium on Graph Drawing & Network Visualization (Graph Drawing 2015), Los Angeles, USA, 26.9.2015. Contributed talk *Drawing graphs using a small number of obstacles*.

European Conference on Combinatorics, Graph Theory and Applications (Eurocomb 2015), Bergen, Norway, 4.9.2015. Contributed talk *A SAT attack on the Erdős–Szekeres conjecture*.

European Conference on Combinatorics, Graph Theory and Applications (Eurocomb 2015), Bergen, Norway, 2.9.2015. Contributed talk *Ramsey numbers of ordered graphs*.

XVI Spanish meeting on computational geometry, Barcelona, Spain, 2.7.2015. Contributed talk *Bounding the pseudolinear crossing number of K_n via simulated annealing*.

31st International symposium on computational geometry (SoCG 2015), Eindhoven, Netherlands, 24.6.2015. Contributed talk *On the Beer index of convexity and its variants*.

Sum(m)it 240, Budapest, Hungary, 10.7.2014. Contributed talk *Ramsey numbers of ordered graphs*.

30th Annual Symposium on Computational Geometry: Young Researchers Forum, Kyoto, Japan, 9.6.2014. Contributed talk *Crossing numbers and characterizations of monotone drawings of K_n* .

20th International Symposium on Graph Drawing, Redmond, Washington, USA, 21.9.2012. Contributed talk *Grid Representations and the Chromatic Number*.

Workshop talks:

32th European Workshop on Computational Geometry EuroCG 2016, Lugano, Switzerland, 1.4.2016. Contributed talk *Holes in 2-convex sets*.

Midsummer combinatorial workshop XXI, Prague, Czech Republic, 30.7.2015. Contributed talk *Drawing graphs using a small number of obstacles*.

CALDAM pre-conference school on discrete mathematics, Kanpur, India, 6.2.2015. Invited talk *On the Beer index of convexity and its variants*.

Midsummer Combinatorial Workshop XX, Prague, Czech Republic, 2.8.2014. Contributed talk *Ramsey numbers of ordered graphs*.

2nd Elbe Sandstones Geometry Workshop, Rynartice, Czech Republic, 4.8.2014. Contributed talk *Recent progress on Hill's conjecture*.

28th European Workshop on Computational Geometry, Assisi, Perugia, Italy, 19.3.2012. Contributed talk *Grid Representations and the Chromatic Number*.

Seminar talks:

Geometry seminar at Alfréd Rényi institute, Budapest, Hungary, 7.10.2016. Seminar talk *Covering lattice points by linear subspaces and counting point-hyperplane incidences*.

Seminar at János Bolyai Mathematical Institute, Szeged, Hungary, 21.10.2016, Seminar talk *Ordered graphs and Ramsey numbers*.

Combinatorics seminar at Alfréd Rényi institute, Budapest, Hungary, 24.11.2016. Seminar talk *Ordered graphs and Ramsey numbers*.

EPFL DCG/DISOPT seminar, Lausanne, Switzerland, 14.7.2015. Seminar talk *Ordered graphs and Ramsey numbers*.

Indian Statistical Institute, Kolkata, India 30.1.2015. Seminar talk *Recent Progress on Hill's Conjecture*.

Geometry Seminar, Alfréd Rényi Institute, Budapest, Hungary, 29.11.2013. Seminar talk *Monotone crossing number of K_n and Recent progress on Hill's Conjecture*.

Grants awarded

Grant GAUK 1262213 of the Grant Agency of the Charles University. Principal investigator of the project *Combinatorial Structures and Discrete Geometry* in 2013–2015.

Grant GAUK 259394 of the Grant Agency of the Charles University. Principal investigator of the project *Ramsey theory in combinatorial and computational geometry* in 2015).

Additional information

I participated in the program DIMACS/DIMATIA Research Experience for Undergraduates 2012, Piscataway, New Jersey, USA.

I was a graduate coordinator of the program DIMACS/DIMATIA Research Experience for Undergraduates 2013, Piscataway, New Jersey, USA.

I was teaching assistant for the following courses.

Discrete mathematics (2012/13, 2013/14, 2014/2015, 2015/16),

Combinatorial and computational geometry I (2012/13, 2013/14, 2014/2015, 2015/2016),

Combinatorial and computational geometry II (2013/2014, 2015/2016),

Graph theory and algorithms for mathematicians (2012/13),

Foundations of algorithms and graph theory (2013/2014, 2014/2015, 2015/2016),

Topological methods in combinatorics (2014/2015).

Foreign languages: Czech (native speaker), English (active knowledge), German (passive knowledge).