Jan Hubička

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Univerzita Karlova v Praze
Department of Applied Mathematics
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Dukelských bojovníků 1944
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Born April 1, 1978 in Tábor, Czech Republic

Education

PhD Degree in Computer Science *2002–2010*
Faculty of Mathematics and Physics, Charles University in Prague
Thesis: *Combinatorial Properties of Finite Models*, advisor Jaroslav Nešetřil

Master Degree in Computer Science *1997–2002*
Faculty of Mathematics and Physics, Charles University in Prague
Thesis: *Ramsey Properties of Universal Sets*, advisor Jaroslav Nešetřil

Employment history

Departement of Applied Mathematics, Prague *since June 2017*
Assistant Professor (habilitation thesis defended October 8 2020)

Computer Science Institute (IUUK), Charles University, Prague *since 2016*
Researcher

University of Calgary, Calgary *2014–2015*
PIMS Postdoctoral Fellow

SUSE ČR s.r.o., Prague *2000–2013 and since 2016*
Senior software developer

Institute of Theoretical Computer Science (ITI), Charles University, Prague *2003–2013 and 2016–2018*
Researcher

Publications

Papers published in refereed international journals

1. D. Evans, J. Hubička, J. Nešetřil: Ramsey properties and extending partial automorphisms for classes of finite structures, Fundamenta Mathematicae 253 (2021), 121–154
2. D. Evans, J. Hubička, M. Konečný, J. Nešetřil: EPPA for two-graphs and antipodal metric spaces, Proceedings of the American Mathematical Society 148 (2020), 1901–1915
3. J. Hubička, J. Nešetřil: All those Ramsey classes: Ramsey classes with closures and forbidden homomorphisms, Advances in Mathematics 356C (2019), 106791.
4. J. Hubička, M. Konečný, J. Nešetřil: A combinatorial proof of the extension property for partial isometries, Commentationes Mathematicae Universitatis Carolinae 60 (1) (2019), 39–47.
5. D. Evans, J. Hubička, J. Nešetřil: Automorphism groups and Ramsey properties of sparse graphs, Proceedings of the London Mathematical Society 119(2) (2019), 515–546.
6. J. Hubička, J. Nešetřil: Bowtie-free graphs have a Ramsey lift, Advances in Applied Mathematics 96 (2018), 286–311.

7. J. Fiala, J. Hubička, J. Nešetřil, Y. Long: Fractal property of the graph homomorphism order, European Journal of Combinatorics 66 (2017), 101–109.
8. J. Hubička, J. Nešetřil: Homomorphism and embedding universal structures for restricted classes, Journal of Multiple-Valued Logic and Soft Computing 27 (2–3) (2016), 229–253.
9. D. Hartman, J. Hubička, J. Nešetřil: Complexities of relational structures, Mathematica Slovaca 65 (2) (2015), 229–246.
10. D. Hartman, J. Hubička, D. Mašulovič: Homomorphism-homogeneous L-colored graphs, European Journal of Combinatorics 35 (2014), 313–323.
11. J. Fiala, J. Hubička, Y. Long: Universality of intervals of line graph order, European Journal of Combinatorics 41 (2014), 221–231.
12. J. Hubička, J. Jost, Y. Long, P. F. Stadler, L. Yang: Relations between graphs, Ars Mathematica Contemporanea 6 (2) (2012), 323–250.
13. J. Hubička, J. Nešetřil: A finite presentation of the rational Urysohn Space, Topology and its Applications 155 (14) (2008), 1483–1492.
14. J. Hubička, J. Nešetřil: Universal partial order represented by means of oriented trees and other simple graphs, European Journal of Combinatorics 26 (2005), 765–778.
15. J. Hubička, J. Nešetřil: Finite presentation of homogeneous graphs, posets and Ramsey classes, Israel Journal of Mathematics 149 (2005), 21–44.
16. J. Hubička, J. Nešetřil: Finite paths are universal, Order 21 (2004), 181–200, and, Order 22 (2005), 21–40[1].

Book Chapters (refereed)

17. J. Hubička, J. Nešetřil: Ramsey classes with closure operations (selected combinatorial applications), Connections in Discrete Mathematics: A Celebration of the Work of Ron Graham (2018).
18. J. Hubička, J. Nešetřil: Universal structures with forbidden homomorphisms, Logic Without Borders: Essays on Set Theory, Model Theory, Philosophical Logic and Philosophy of Mathematics (2015), 241–264.
19. J. Hubička, J. Nešetřil: Some examples of universal and generic partial orders, Model Theoretic Methods in Finite Combinatorics: AMS-ASL Special Session, 2009, 293–318.

Papers accepted to refereed international journals

20. J. Hubička, M. Konečný, J. Nešetřil: Conant's generalised metric spaces are Ramsey, accepted to Contributions to Discrete Mathematics, arXiv:1710.04690, 2017, 20 pages.
21. A. Aranda, J. Hubička, E. K. Hng, M. Karamanlis, M. Kompatscher, M. Konečný, M. Pawliuk, D. Bradley-Williams: Completing graphs to metric spaces, accepted to Contributions in Discrete Mathematics, 2017, 19 pages.

Papers accepted to international conferences

22. J. Hubička: Big Ramsey degrees of the universal homogeneous partial order are finite, Algebras, Graphs and Ordered Sets (extended abstract), ALGOS 2020, 183–184.
23. M. Balko, D. Chodounský, Jan Hubička, M. Konečný, L. Vena: Big Ramsey degrees of 3-uniform hypergraphs (extended abstract), Acta Mathematica Universitatis Comenianae 88 (3) (2019), 415-422.
24. J. Hubička, M. Konečný, J. Nešetřil: Ramsey properties of edge-labelled graphs via completions (extended abstract), Acta Mathematica Universitatis Comenianae 88 (3) (2019), 801–805.
25. J. Hubička, C. Jahel, M. Konečný, M. Sabok: Extending partial automorphisms of n-partite tournaments (extended abstract), Acta Mathematica Universitatis Comenianae 88 (3) (2019), 807–811.

[1]Due to editorial accident the paper appeared in the last volume of 2004 as well as in the first volume of 2005.

26. J. Hubička, J. Nešetřil, P. Oviedo: Density and fractal property of the class of oriented trees (extended abstract), Acta Mathematica Universitatis Comenianae 88 (3) (2019), 813–818.
27. A. Aranda, J. Hubička, E. K. Hng, M. Karamanlis, M. Kompatscher, M. Konečný, M. Pawliuk, D. Bradley-Williams: Completing graphs to metric spaces (extended abstract), Eurocomb 2017, Electronic Notes in Discrete Mathematics 61(2017), 53–60.
28. J. Hubička, J. Nešetřil: Ramsey theorem for designs (extended abstract), Eurocomb 2017, Electronic Notes in Discrete Mathematics 61(2017), 623-629.
29. J. Fiala, J. Hubička, Y. Long: Gaps in full homomorphism order (extended abstract), Eurocomb 2017, Electronic Notes in Discrete Mathematics 61(2017), 429-435.
30. J. Fiala, J. Hubička, Y. Long: An universality argument for graph homomorphisms (extended abstract), Eurocomb 2015, Electronic Notes in Discrete Mathematics 49(2015), 643–649.
31. J. Hubička, J. Nešetřil: Ramsey classes with forbidden homomorphisms and a closure, Eurocomb 2015, Electronic Notes in Discrete Mathematics 49(2015), 737-745
32. D. Hartman, J. Hubička, J. Nešetřil: Towards bounds of relational complexity (extended abstract), Bordeaux Graph Workshop, 2014, 17–18.
33. D. Hartman, J. Hubička, J. Nešetřil: Combinatorial bounds on relational complexity (extended abstract), The Seventh European Conference on Combinatorics, Graph Theory and Applications, CRM Series 16 (2013), 573–578.
34. J. Hubička, T. Glek: Optimizing real world applications with GCC Link-Time Optimization. GCC Developers' Summit Proceedings 2010, 25–46.
35. J. Hubička: Interprocedural optimization framework in GCC. GCC Developers' Summit Proceedings 2007, 59–68.
36. J. Hubička: Interprocedural optimization on function local SSA form. GCC Developers' Summit Proceedings 2006, 75–84.
37. J. Hubička: Profile driven optimizations in GCC. GCC Developers' Summit Proceedings 2005, 107–124.
38. J. Hubička, Z. Kovács, Z. Kovács: Visualizations on the complex plane, Computer algebra systems and dynamic geometry systems in mathematics teaching, Proceedings of "Sprout-Selecting" Conference, 12-27, 2004.
39. J. Hubička: Call graph module in GCC. GCC Developers' Summit Proceedings 2004, 64–78.
40. J. Hubička: Porting GCC to the AMD64 architecture. GCC Developers' Summit Proceedings 2003, 79–106.

Theses

41. J. Hubička, Structural Ramsey Theory and the Extension Property for Partial Automorphisms, habilitation thesis, Charles University 2020.
42. J. Hubička, Combinatorial Properties of Finite Models, dissertation thesis, 2010.
43. J. Hubička, Ramsey Properties of Universal Sets (in Czech), diploma thesis, Charles University 2002.

Other publications (selected)

44. J. Hubička, Odhad kvality fotografických materálů a metody jejich digitalizace (in Czech), Zprávy památkové péče, National Heritage Institute, 1/2016.
45. J. Hubička, Digitizing historical photographs at Šechtl and Voseček Musuem of Photography (in Czech), Digitalizace aneb konec oslích uší, National Library, Prague, 2010.
46. J. Hubička, Šechtl and Voseček Studios (in Czech), Historická fotografie, 2007.
47. Z. Dvořák, J. Hubička, P. Nejedlý and J. Zlomek: Infrastructure for Profile Driven Optimizations in GCC Compiler, project report, 2003.

48. H.J. Lu, M. Matz, J. Hubička, A. Jaeger, M. Mitchel (ed.): System V Application Binary. Interface. x86-64 Architecture Processor Supplement, 2000–2007. (Original author of specification of low-level datastructure layout and function call conventions.)

Submitted

49. M Balko, D Chodounský, J Hubička, M Konečný, L Vena: Big Ramsey degrees of 3-uniform hypergraphs are finite, arXiv:2008.00268 (2020)
50. J. Hubička, M. Konečný, J. Nešetřil: All those EPPA classes (Strengthenings of the Herwig-Lascar theorem), arXiv:1902.03855, 2020
51. A. Aranda, J. Hubička, M. Karamanlis, M. Kompatscher, M. Konečný, M. Pawliuk, D. Bradley-Williams: Ramsey expansions of metrically homogeneous graphs, arXiv:1707.02612, 2017, 56 pages.
52. D. M. Evans, J. Hubička, M. Konečný: Simplicity of the automorphism groups of generalised metric spaces, arXiv:1907.13204, 2019
53. J. Hubička, M. Kompatscher, M. Konečný: Forbidden cycles in metrically homogeneous graphs, arXiv:1808.05177, 2018.

Preprints

54. J. Hubička: Big Ramsey degrees using parameter spaces, arXiv:2009.00967, 2020.

In final stages of preparation

55. J. Hubička, M. Konečný, J. Nešetřil: Semigroup-valued metric spaces: Ramsey expansions and EPPA, 20 pages.

Teaching experience

1. Lecturer of Algorithms and Data Structures II, Charles University, Prague, 2019, 2020
2. Lecturer of Combinatorics and graphs II, Charles University, Prague, 2018-2019
3. Lecturer of Linear Algebra, Charles University, Prague, 2017-2018
4. Lecturer of Algorithms and Data Structures I, Charles University, Prague, 2017, 2019, 2020
5. Advanced code optimization techniques used in industrial strength compilers, 2017-2020
6. Teaching assistant of Discrete Mathematics, Charles University, Prague, 2017
7. Co-lecturer of Selected topics in Combinatorics I,II (with J. Nešetřil), Charles University, Prague, 2015–2020
8. Lecturer of Math 311 — Linear Methods II, University of Calgary, 2015
9. Lecturer of Math 211 — Linear Methods I, University of Calgary, 2014
10. Lecturer of Advanced code optimization techniques used in industrial strength compilers, Charles University, Prague, 2008–2013
11. Lecturer of seminar Advanced code optimization techniques used in industrial strength compilers, Charles University, Prague, 2003–2008
12. Lecturer of workshop Digitalizace fotografií, National Technical Museum, Prague, 2009
13. Teaching assistant of Algorithms, Charles University, Prague, 2004–2007, 2009
14. Teaching assistant of Discrete Mathematics, Charles University, Prague, 2002–2004

Students

Bachelor degree

1. Matěj Konečný: Combinatorial Properties of Metrically Homogeneous Graphs, 2018 (defended)
2. Stanislav Lukeš: API for C# code generation, 2020 (defended)
3. Pablo Oviedo Timoneda: Universal intervals in the homomorphism order of digraphs, 2018–2019 (defended)

Master degree

4. Martin Jambor: Optimizations in the GNU Compiler Collection targeted at scientific computing, 2005–2007 (defended)
5. Ondřej Bílka: Pattern Matching in Compilers, 2011–2012 (defended)
6. Martin Liška: Optimizing large applications, 2012–2013 (defended)
7. Ladislav Láska: Scalable link-time optimization, 2015–2017 (defended)

Doctoral degree

8. Matěj Konečný: Semigroup-valued metric spaces, since 2018
9. Ondřej Bílka: Optimizing dynamic and functional languages, 2013–2020 (not defended)

Organization of conferences and service to community

1. Graphs and Networks in Context 2019 (co-organized with J. Nešetřil and M. Konečný), Charles University, Prague, 2019
2. Sparsity DocCourse Prague 2018 (co-organized with J. Nešetřil and M. Konečný), Charles University, Prague, 2018
3. Main organizer of workshops "GNU Tools Cauldron", Charles University, Prague, 2012, 2015, 2017
4. Ramsey DocCourse Prague 2016 (co-organized with J. Nešetřil), Charles University, Prague, 2016
5. Co-organizer of workshops "GNU Tools Cauldron", 2013 (Google Headquarters, Mountain View), 2014 (Cambridge), 2016 (Hedben Bridge)
6. Workshop "Space, Color", Motion, National Technical Museum Prague, 2013
7. Workshop "Legacy of three color photography", National Technical Museum, Prague, 2008

Membership in program committees

1. Midsummer Combinatorial Workshop, Charles University, Prague, 2017-2020
2. Workshop "GNU Tools Cauldron", 2012-2019
3. Ramsey DocCourse Prague 2016, Charles University, Prague, Oct–Dec 2016, March 2017
4. Workshop "Space, Color, Motion", National Technical Museum, Prague, 2013
5. Workshop "GROW 2011: 3rd International Workshop on GCC Research Opportunities", CGO, Chamonix 2011
6. Workshop "2nd International Workshop on GCC Research Opportunities", HiPEAC 2010, Pisa, 2010
7. Workshop "GCC Research Opportunities, 4th International Conference on High-Performance Embedded Architectures and Compilers", HiPEAC, Paphos, 2009
8. Workshop "Legacy of three color photography", National Technical Museum, Prague, 2008
9. Workshop "GREPS: International Workshop on GCC for Research in Embedded and Parallel Systems, 16th International Conference on Parallel Architectures and Compilation Techniques", PACT, Brasov, 2007

Awards and grants

1. IBM Faculty Award 2015
2. PIMS Postdoctoral Fellowship, 2014–2015
3. GAČR junior grant (Model theory and extremal combinatorics), 2018–2020
4. Teaching award, Charles University (for lecture and practicals on Algorithms and Datastructures I), 2020
5. MŠMT Award for Outstanding Results of Research, Experimental Development and Innovation (for results in the area of structural Ramsey theory), 2020
6. Standard GAČR grant (Ramsey theory in the context of group theory, model theory and topological dynamics), 2021-2023

Participation in research networks

1. ERC Synergy since 2019
2. STRUCO (Structures in Combinatorics), associated International Laboratory of CNRS between DIMATIA, Prague, and LIAFA, Paris, since 2012
3. HiPEAC (European Network on High Performance and Embedded Architecture and Compilation), since 2009
4. COMBSTRU (Combinatorial Structure of Intractable Problems), 2002–2006

Lectures (selected, invited lectures emphasized)

1. *Ramsey classes using parameter spaces*, Oberwolfach workshop "Homogeneous Structures: Model Theory meets Universal Algebra", zoom 2021
2. *Big Ramsey degrees of the universal homogeneous parital order are finite*, ALgebras, Graphs and Ordered sets 2020 (ALGOS), Big Blue Button 2020
3. *Cycles in metrically homogeneous graphs*, 2020 CoSP Midterm Meeting, zoom 2020
4. *Big Ramsey degrees hypergraphs*, Cornell logic seminar, Ithaca 2019
5. *The extensions property for partial automorphisms*, series of 3 lectures jointly with Matěj Konečný, RUTGERS logic seminar, New Brunswick 2019
6. *Big Ramsey degrees of the 3-uniform hypergraph*, EUROCOMB, Bratislava 2019
7. On Hrushovski properties of Hrushovski constructions, Logic colloquia, Prague 2019
8. *Metrically homogeneous graphs as homogenizations of* $(1, \delta)$*-structures*, 2018 CMS Winter Meeting, Vancouver 2018
9. *Combinatorial proofs of the extension property for partial automorphisms*, Unifying Themes in Ramsey Theory, Banff 2018
10. *On the existence of Ramsey expansions.* Ramsey Theory in Logic, Combinatorics and Complexity, Bertinoro 2018
11. *Ramsey theorems for classes of structures with functions and relations.* Model Theory and Combinatorics, Paris 2018
12. *Ramsey properties of Hrushovski construction.* Zámeček, Hraniční zámeček 2017
13. *Ramsey theorem for designs.* European Conference on Combinatorics, Graph Theory and Applications, Vienna 2017
14. *On the existence of Ramsey expansions.* Beauty of Discrete Mathematics, Montreal 2017
15. *Automorphism Groups and Ramsey Properties of Sparse Graphs*, Workshop on Metafinite Model Theory and Definability and Complexity of Numeric Graph Parameters, Rejkjavik 2017

16. *Very sparse graphs are Ramsey*, Czech-Slovak Conference on Combinatorics and Graph Theory, Hejnice 2017
17. Series of 5 lectures at Ramsey DocCourse Prague 2016, Charles University, Prague, September 15 – December 31, 2016
18. *All those Ramsey classes (Ramsey classes with closures and forbidden homomorphisms).* Logic Colloquium, Leeds 2016
19. Porting GCC to AMD GCN microarchitecture. GNU Tools Cauldron, Hedben Bridge, 2016
20. *Porting GCC to AMD GCN microarchitecture.* SUSElabs conference, Mikulov, 2016
21. *Ramsey Classes by Partite Construction.* 2 lectures. Permutation Groups and Transformation Semigroups, EPSRC Durham Symposium, 2015
22. *An universality argument for graph homomorphisms.* Eurocomb, 2015
23. *Ramsey classes with forbidden homomorphisms and a closure.* Eurocomb, 2015
24. *Ramsey classes with forbidden homomorphisms and a closure.* Shanghai Jiao Tong University, 2015
25. Ramsey lifts of classes of intersection graphs. CanaDAM, 2015
26. *Ramsey classes with algebraic closure and forbidden homomorphisms.* Logic Seminar, University of Illinois at Urbana-Champaign, 2015
27. *Examples of Ramsey lifts.* Combinatorial Seminar, University of Illinois at Urbana-Champaign, 2015
28. Types and type based optimizations in GCC. GNU Tools Cauldron, Charles University, Prague 2015
29. *Multiamalgamation classes are Ramsey.* Homogeneous Structures, Banff 2015
30. *Ramsey classes—properties, examples and constructions.* Combinatorial seminar, Iowa State University 2015
31. Devirtualization in GCC, GNU Tools Cauldron, Cambridge, 2015
32. *Interprocedural and link-time optimization in GCC.* IBM Colloquia, New York, 2014
33. *Ramsey classes with algebraical closure and forbidden homomorphisms.* Algebraic and Model Theoretical Methods in Constraint Satisfaction, Banff, 2014
34. Collection of Finlay-Color negatives from the American Colony in Jerusalem. Space, Color, Motion, National Technical Museum, Prague, 2013
35. *Combinatorial bounds on relational complexity.* Eurocomb, Pisa, 2013
36. *Ramsey expansions of classes with non-trivial algebraic closure*, Descriptive Set Theory Seminar, Rutgers, 2014
37. *Bowtie-free graphs have Ramsey lift.* Universality and Homogeneity Hausdorff Trimester Program, Bonn, 2013
38. Constrained homomorphism orders. ČS Grafy, Litomyšl, 2012
39. Constrained homomorphism orders. Shanghai Conference on Algebraic Combinatorics, Shanghai, 2012
40. *Locally injective homomorphisms are universal.* 2nd Workshop on Homogeneous Structures, Charles University, Prague, 2012
41. Constrained homomorphism orders. Bordeaux Graph Workshop, Bordeaux, 2012
42. Link time optimization in GCC. OpenSUSE conference, Nuernberg, 2011
43. *Explicit construction of universal structures as shadows of ultrahomogeneous structures.* LMS Northern Regional Meeting and Workshop on Homogeneous Structures, Leeds 2011
44. Digital processing of early color photography. OpenSUSE conference, Nuernberg, 2011
45. *Digitální zpracování Ranné barvné fotografie.* Archivy, knihovny a muzea v digitálním světě, 2011
46. Optimizing real world applications with GCC Link Time Optimization. GCC Summit, Ottawa, 2010
47. Some examples of universal and generic partial orders. Young Researchers Forum, MFCS, 2010

48. Universal structures as shadows of ultrahomogeneous structures. Fete of Combinatorics and Computer Science 2009, Keszthely, Hungary
49. *Digitizing Historical Negatives*. 9. konference Archivy, knihovny, muzea v digitálním světě. Selected as the best presentation of the conference, National Archive, Prague, 2008
50. *Digitalizace fotografických předloh*, digitalizace fotografií, National Technical Museum, Prague 2008
51. *Interprocedural Optimization Framework*. Gelato ICE Conference & Expo, San Jose, California , 2007
52. Interprocedural optimization framework in GCC. GCC Summit, Ottawa, 2007
53. Interprocedural optimization on function local SSA form in GCC. GCC Summit, Ottawa, 2006
54. *Profile Driven Optimizations in GCC*. Gelato GCC on Itanium Improvement Workshop, Russian Academy of Sciences, Moscow, 2006
55. *Finite Paths are Universal*. COMBSTRU final workshop, Barcelona, 2006
56. Preparing of Albumen Paper. Historické fotografické techniky/Edeldrucke, Jindřichùv Hradec, 2006
57. Profile driven optimizations in GCC. GCC Summit, Ottawa, 2005
58. Call graph module in GCC (framework for intraprocedural optimization). GCC Summit, Ottawa, 2004
59. x86-64 support in GCC. GCC Summit, Ottawa, 2003

Software projects (selected)

1. Port of AMD GCN architecture, 2016-2017
2. Incremental scalable link time optimization framework in GCC, since 2009
3. Interprocedural optimization framework in GCC, since 2004
4. Port of GCC to x86-64 architecture, Architecture Binary Interface design, since 2000
5. Profile driven optimizations in GCC, 1998–2003
6. GNU Compiler Collection (GCC) i386 backend improvements, 1997–2000
7. AA-project (ASCII art library and tools), 1997–2000
8. XaoS (realtime fractal zoomer), 1995–1999
9. Koules (game), 1993–1995

Other activities

Digitization of archive Šechtl and Voseček since 2004
Software, web pages, historical research, co-authoring texts for exhibitions, preparing digital prints from historical negatives and cooperating on preparing the exhibitions

Co-maintainer of GNU Compiler Collection since 2001
Maintainer of inter-procedural optimization framework, profile feedback optimization framework and x86 backend