Curriculum Vitae

Milan Hladík

Contact

Office

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Education and academic degrees

2015	Doc. at Charles University, habilitation thesis: Interval linear algebra
2003 – 2006	PhD study at Charles University, Faculty of Mathematics and Physics, branch of study: Econometrics and operations research, PhD thesis: Explicit description of supporting and separating hyperplanes of convex polyhedral sets depending on parameters, (supervisor: Libuše Grygarová).
1997 – 2003	Master study at Charles University, Faculty of Mathematics and Physics, study program: Computer science, specialization: Discrete mathematics and optimization, thesis: Postoptimal analysis for transportation problem.

Teaching experiences

at Faculty of Mathematics and Physics, Charles University (2003–?):

- basic course in Linear algebra I, II and III, advanced lectures in Integer programming, Multicriteria optimization, Fundamentals of nonlinear optimization, Nonlinear optimisation algorithms, Discrete and Continuous Optimization.
- introducing and teaching Interval methods
- introducing and leading Optimization seminar

- teaching assistant of Discrete mathematics, Graph theory and combinatorics I, Algorithms and data structures II (besides the aforementioned).

Working experiences

2015/?	Associate professor at Charles University, Faculty of Mathematics and Physics, Department of Applied Mathematics
2012/?	External researcher at University of Economics, Faculty of Informatics and Statistics, Department of Econometrics
2009/2015	Assistant professor at Charles University, Faculty of Mathematics and Physics, Department of Applied Mathematics
2008	(17 December 2007 – 31 August 2008) Postdoc position in COPRIN team at INRIA, Sophia Antipolis, France. Research subject: Interval linear algebra.
2006/2009	Junior researcher at Charles University, Faculty of Mathematics and Physics, Department of Applied Mathematics

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Academic experiences

2015/?	head of Optimization Division at the Department of Applied Mathematics
2012/2015	scientific secretary at the Department of Applied Mathematics

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Miscellanea

2016	in June 23, author of a new logo of the Department of Applied Mathematics

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Guests

2015	*Marzieh Dehghani-Madiseh*, Amirkabir Univ. of Technology, Tehran, Iran topic: New methods in interval matrix computations
2015	*Snehashish Chakraverty*, National Institute of Technology Rourkela, India topic: Interval linear equations
2012	*Sanaz Rivaz*, Shahid Bahonar University of Kerman, Kerman, Iran, topic: Multiobjective linear programming with interval coefficients

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Students

- Bachelor's students: 10 defeated
- Master's students: 5 defeated
- PhD students: 4 currently under supervision
  - *Elif Garajová* (since 2016), Interval linear programming

– *Matej Moravčík* (since 2014), Algorithms for extensive form games with imperfect information
– *Martin Schmid* (since 2013), Algorithmic game theory
– *Jaroslav Horáček* (since 2011), Interval linear and nonlinear systems,
Young scientists award from MatTriad'13 and invited speaker to MatTriad'15,

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Research area and area of interest

Interval analysis:

- Interval-valued linear systems and interval matrices; Numerical analysis and matrix theory; Interval-valued regression problems and statistics

Optimization and operations research:

- Global optimization; Linear programming; Multiobjective optimization; Parametric programming and sensitivity analysis; Game theory

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Membership

- EUROPT – The Continuous Optimization Working Group of EURO (since 2008)
- JČMF – Union of Czech Mathematicians and Physicists (since 2010)
- fellow of the Papua New Guinea Mathematical Society (since 2013)
- SIAM – Society for Industrial and Applied Mathematics (since 2015)
- ILAS – International Linear Algebra Society (since 2016)

Editorial Board

- Reliable Computing (since 2016)
- International Journal of Fuzzy Computation and Modelling (since 2013)

Invited plenary talks at conferences and workshops

- *Interval Programming* (with M. Černý, invited series of 8 lectures), workshop for the 7th International Conference of Iranian Operations Research Society, OR 2014, May 12–13, Semnan, Iran.
- *Optimization with uncertain, inexact or unstable data: Linear programming and the interval approach* (with M. Černý, invited lecture), 10th International Conference on Strategic Management and its Support by Information Systems, SMSIS 2013, August 29–30, Valašské Meziříčí, Czech Republic.
- *New directions in interval linear programming*, 15th GAMM-IMACS International Symposium on Scientific Computing, Computer Arithmetic and Verified Numerical Computations, SCAN 2012, September 23–29, Novosibirsk, Russia.

- *Algorithms, complexity and interval data* (with M. Černý, in czech), 17th summer school of JČMF, ROBUST 2012, September 9–14, Němčičky, Czech Republic.

Conference organizing

- 8th Small Workshop on Interval Methods, SWIM 2015, June 9-11, 2015, Prague, Czech Republic. `http://kam.mff.cuni.cz/conferences/swim2015/`

Grant projects

Principal investigator:

- *Interval methods for optimization problems*, 2013–2017, grant P402-13-10660S of the Grant Agency of the Czech Republic.

Team member:

- *Decision Making in Uncertain Environment: Stability Analysis and Robustification of Optimization Models*, 2016–2018, grant P403-16-00408S of the Grant Agency of the Czech Republic, principal investigator M. Černý.
- *Center of excellence – Institute for Theoretical Computer Science*, 2012–2018, research center supported by the project P202/12/G061 of GA CR, principal investigator J. Nešetřil.
- *Models of Optimal Economic Decision Making under Instability, Uncertainty and Indeterminacy*, 2012–2015, grant P403/12/1947 of the Grant Agency of the Czech Republic, principal investigator M. Černý.
- *Center of Modern Computer Science*, 2012–2017, Charles University research center in the program UNCE, principal investigator J. Sgall.
- *PRVOUK P46 – Computer Science*, 2011–2015, Charles University grant, principal coordinator O. Čepek.
- *Modern methods, structures and systems of computer science*, 2005–2011, grant MSM0021620838 of the Ministry of education of the Czech Republic, principal investigator J. Kratochvíl.

Papers in journals

[1] Milan Hladík. Transformations of interval linear systems of equations and inequalities. *Linear Multilinear Algebra*, 65(2):211–223, 2017.

[2] Michal Černý and Milan Hladík. Inverse optimization: towards the optimal parameter set of inverse LP with interval coefficients. *Cent. Eur. J. Oper. Res.*, 24(3):747–762, 2016.

[3] Milan Hladík. An extension of the αBB-type underestimation to linear parametric Hessian matrices. *J. Glob. Optim.*, 64(2):217–231, 2016.

[4] Milan Hladík. Robust optimal solutions in interval linear programming with forall-exists quantifiers. *Eur. J. Oper. Res.*, 254(3):705–714, 2016.

[5] Milan Hladík and Michal Černý. First step immersion in interval linear programming with linear dependencies. *Bull. Iranian Math. Soc.*, 42(7):43–53, 2016.

[6] Milan Hladík and Jiří Rohn. Radii of solvability and unsolvability of linear systems. *Linear Algebra Appl.*, 503:120–134, 2016.

[7] Amin Mostafaee, Milan Hladík, and Michal Černý. Inverse linear programming with interval coefficients. *J. Comput. Appl. Math.*, 292:591–608, 2016.

[8] Sanaz Rivaz, Mohammad Ali Yaghoobi, and Milan Hladík. Using modified maximum regret for finding a necessarily efficient solution in an interval MOLP problem. *Fuzzy Optim. Decis. Mak.*, 15(3):237–253, 2016.

[9] Amir Shahin, Payam Hanafizadeh, and Milan Hladík. Sensitivity analysis of linear programming in the presence of correlation among right-hand side parameters or objective function coefficients. *Cent. Eur. J. Oper. Res.*, 24(3):563–593, 2016.

[10] Milan Hladík. On the efficient Gerschgorin inclusion usage in the global optimization αBB method. *J. Glob. Optim.*, 61(2):235–253, 2015.

[11] Milan Hladík. Complexity issues for the symmetric interval eigenvalue problem. *Open Math.*, 13(1):157–164, 2015.

[12] Milan Hladík. AE solutions and AE solvability to general interval linear systems. *Linear Algebra Appl.*, 465(0):221–238, 2015.

[13] Milan Hladík and Michal Černý. Total least squares and Chebyshev norm. *Procedia Comput. Sci.*, 51(0):1791–1800, 2015.

[14] Milan Hladík and Evgenija D. Popova. Maximal inner boxes in parametric AE-solution sets with linear shape. *Appl. Math. Comput.*, 270:606–619, 2015.

[15] Michal Černý and Milan Hladík. The complexity of computation and approximation of the t-ratio over one-dimensional interval data. *Comput. Stat. Data Anal.*, 80(0):26–43, 2014.

[16] Milan Hladík. How to determine basis stability in interval linear programming. *Optim. Lett.*, 8(1):375–389, 2014.

[17] Milan Hladík. New operator and method for solving real preconditioned interval linear equations. *SIAM J. Numer. Anal.*, 52(1):194–206, 2014.

[18] Milan Hladík. Strong solvability of linear interval systems of inequalities with simple dependencies. *Int. J. Fuzzy Comput. Model.*, 1(1):3–14, 2014.

[19] Milan Hladík. On approximation of the best case optimal value in interval linear programming. *Optim. Lett.*, 8(7):1985–1997, 2014.

[20] Milan Hladík and Michal Černý. Tolerance approach to possibilistic nonlinear regression with interval data. *IEEE Trans. Cybern.*, 44(12):2509–2520, 2014.

[21] Milan Hladík and Stefan Ratschan. Efficient solution of a class of quantified constraints with quantifier prefix exists-forall. *Math. Comput. Sci.*, 8(3-4):329–340, 2014.

[22] Michal Černý, Jaromír Antoch, and Milan Hladík. On the possibilistic approach to linear regression models involving uncertain, indeterminate or interval data. *Inf. Sci.*, 244:26–47, 2013.

[23] Milan Hladík. Bounds on eigenvalues of real and complex interval matrices. *Appl. Math. Comput.*, 219(10):5584–5591, 2013.

[24] Milan Hladík. Weak and strong solvability of interval linear systems of equations and inequalities. *Linear Algebra Appl.*, 438(11):4156–4165, 2013.

[25] Milan Hladík and Sebastian Sitarz. Maximal and supremal tolerances in multiobjective linear programming. *Eur. J. Oper. Res.*, 228(1):93–101, 2013.

[26] Evgenija D. Popova and Milan Hladík. Outer enclosures to the parametric AE solution set. *Soft Comput.*, 17(8):1403–1414, 2013.

[27] Jaroslav Horáček and Milan Hladík. Computing enclosures of overdetermined interval linear systems. *Reliab. Comput.*, 19(2):142–155, 2013.

[28] Michal Černý and Milan Hladík. Two complexity results on c-optimality in experimental design. *Comput. Optim. Appl.*, 51(3):1397–1408, 2012.

[29] Milan Hladík. Complexity of necessary efficiency in interval linear programming and multiobjective linear programming. *Optim. Lett.*, 6(5):893–899, 2012.

[30] Milan Hladík. Enclosures for the solution set of parametric interval linear systems. *Int. J. Appl. Math. Comput. Sci.*, 22(3):561–574, 2012.

[31] Milan Hladík and Michal Černý. Interval regression by tolerance analysis approach. *Fuzzy Sets Syst.*, 193:85–107, 2012.

[32] Milan Hladík, David Daney, and Elias P. Tsigaridas. An algorithm for addressing the real interval eigenvalue problem. *J. Comput. Appl. Math.*, 235(8):2715–2730, 2011.

[33] Milan Hladík, David Daney, and Elias P. Tsigaridas. A filtering method for the interval eigenvalue problem. *Appl. Math. Comput.*, 217(12):5236–5242, 2011.

[34] Milan Hladík, David Daney, and Elias P. Tsigaridas. Characterizing and approximating eigenvalue sets of symmetric interval matrices. *Comput. Math. Appl.*, 62(8):3152–3163, 2011.

[35] Milan Hladík and Luc Jaulin. An eigenvalue symmetric matrix contractor. *Reliab. Comput.*, 16:27–37, 2011.

[36] Milan Hladík. Optimal value bounds in nonlinear programming with interval data. *TOP*, 19(1):93–106, 2011.

[37] Milan Hladík. Tolerance analysis in linear systems and linear programming. *Optim. Methods Softw.*, 26(3):381–396, 2011.

[38] Milan Hladík, David Daney, and Elias Tsigaridas. Bounds on real eigenvalues and singular values of interval matrices. *SIAM J. Matrix Anal. Appl.*, 31(4):2116–2129, 2010.

[39] Milan Hladík. On the separation of parametric convex polyhedral sets with application in MOLP. *Appl. Math.*, 55(4):269–289, 2010.

[40] Milan Hladík. Interval valued bimatrix games. *Kybernetika*, 46(3):435–446, 2010.

[41] Milan Hladík. Solution sets of complex linear interval systems of equations. *Reliab. Comput.*, 14:78–87, 2010.

[42] Milan Hladík. Generalized linear fractional programming under interval uncertainty. *Eur. J. Oper. Res.*, 205(1):42–46, 2010.

[43] Milan Hladík. Multiparametric linear programming: support set and optimal partition invariancy. *Eur. J. Oper. Res.*, 202(1):25–31, 2010.

[44] Milan Hladík. Optimal value range in interval linear programming. *Fuzzy Optim. Decis. Mak.*, 8(3):283–294, 2009.

[45] Milan Hladík. Separation of convex polyhedral sets with column parameters. *Kybernetika*, 44(1):113–130, 2008.

[46] Milan Hladík. Description of symmetric and skew-symmetric solution set. *SIAM J. Matrix Anal. Appl.*, 30(2):509–521, 2008.

[47] Milan Hladík. Computing the tolerances in multiobjective linear programming. *Optim. Methods Softw.*, 23(5):731–739, 2008.

[48] Milan Hladík. Additive and multiplicative tolerance in multiobjective linear programming. *Oper. Res. Lett.*, 36(3):393–396, 2008.

[49] Milan Hladík. Solution set characterization of linear interval systems with a specific dependence structure. *Reliab. Comput.*, 13(4):361–374, 2007.

Book chapters

[1] Milan Hladík. Interval linear programming: A survey. In Zoltán Ádám Mann, editor, *Linear Programming – New Frontiers in Theory and Applications*, chapter 2, pages 85–120. Nova Science Publishers, New York, 2012.

Papers in proceedings

[1] David Hartman and Milan Hladík. Tight bounds on the radius of nonsingularity. In Marco Nehmeier et al., editor, *Scientific Computing, Computer Arithmetic, and Validated Numerics: 16th International Symposium, SCAN 2014, Würzburg, Germany, September 21-26*, volume 9553 of *LNCS*, pages 109–115. Springer, 2016.

[2] Milan Hladík. Optimal preconditioning for the interval parametric Gauss–Seidel method. In Marco Nehmeier, Jürgen Wolff von Gudenberg, and Warwick Tucker, editors, *Scientific Computing, Computer Arithmetic, and Validated Numerics: 16th International Symposium, SCAN 2014, Würzburg, Germany, September 21-26*, volume 9553 of *LNCS*, pages 116–125. Springer, 2016.

[3] Matej Moravčík, Martin Schmid, Karel Ha, Milan Hladík, and Stephen J. Gaukroder. Refining subgames in large imperfect information games. In *Proceedings of the Thirtieth AAAI Conference on Artificial Intelligence*, pages 572–578, Palo Alto, California, 2016. AAAI Press.

[4] Jan Bok and Milan Hladík. Selection-based approach to cooperative interval games. In Dominique de Werra, Greg H. Parlier, and Begoña Vitoriano, editors, *Operations Research and Enterprise Systems*, volume 577 of *Communications in Computer and Information Science*, pages 40–53. Springer, Switzerland, 2015.

[5] Martin Schmid, Matej Moravčík, Milan Hladík, and Stephen J. Gaukroder. Automatic public state space abstraction in imperfect information games. In *Computer Poker and Imperfect Information: Papers from the 2015 AAAI Workshop*, pages 51–56. AAAI Press, 2015.

[6] Milan Hladík and Jaroslav Horáček. Interval linear programming techniques in constraint programming and global optimization. In Martine Ceberio and Vladik Kreinovich, editors, *Constraint Programming and Decision Making*, volume 539 of *Studies in Computational Intelligence*, pages 47–59. Springer, 2014.

[7] Milan Hladík and Jaroslav Horáček. A shaving method for interval linear systems of equations. In Roman Wyrzykowski, Jack Dongarra, Konrad Karczewski, and Jerzy Waśniewski, editors, *Parallel Processing and Applied Mathematics*, volume 8385 of *LNCS*, pages 573–581. Springer, 2014.

[8] Jaroslav Horáček and Milan Hladík. Subsquares approach – a simple scheme for solving overdetermined interval linear systems. In Roman Wyrzykowski, Jack Dongarra, Konrad Karczewski, and Jerzy Waśniewski, editors, *Parallel Processing and Applied Mathematics*, volume 8385 of *LNCS*, pages 613–622. Springer, 2014.

[9] Martin Schmid, Matej Moravčík, and Milan Hladík. Bounding the support size in extensive form games with imperfect information. In *Proceedings of the Twenty-Eighth AAAI Conference on Artificial Intelligence*, pages 784–790, Palo Alto, California, 2014. AAAI

Press.

[10] Michal Černý and Milan Hladík. Optimization with uncertain, inexact or unstable data: Linear programming and the interval approach. In Radek Němec and František Zapletal, editors, *Proceedings of the 10th International Conference on Strategic Management and its Support by Information Systems*, pages 35–43, Ostrava, 2013. VŠB - Technical University of Ostrava.

[11] Jaromír Antoch, Michal Černý, and Milan Hladík. On computational complexity of construction of c-optimal linear regression models over finite experimental domains. *Tatra Mt. Math. Publ.*, 51:11–21, 2012.

[12] Milan Hladík. An interval linear programming contractor. In Jaroslav Ramík and Daniel Stavárek, editors, *Proceedings 30th Int. Conf. Mathematical Methods in Economics 2012, Karviná, Czech Republic*, pages 284–289 (Part I.). Silesian University in Opava, School of Business Administration in Karviná, September 2012.

[13] Milan Hladík and Michal Černý. On the tolerance approach to possibilistic nonlinear regression over interval data. In M. Vořechovský et al., editor, *REC 2012, Proceedings of the 5th International Conference on Reliable Engineering Computing - Practical Applications and Practical Challenges, June 13-15, Brno*, pages 183–195. LITERA, 2012.

[14] Milan Hladík. Error bounds on the spectral radius of uncertain matrices. In T.E. Simos, editor, *Proceedings of the International Conference on Numerical Analysis and Applied Mathematics 2011 (ICNAAM-2011), G-Hotels, Halkidiki, Greece, 19-25 September*, volume 1389 of *AIP Conference Proceedings*, pages 882–885, Melville, New York, 2011. American Institute of Physics (AIP).

[15] Michal Černý and Milan Hladík. The regression tolerance quotient in data analysis. In Michal Houda and Jana Friebelová, editors, *CD-ROM Proceedings 28-th Int. Conf. Mathematical Methods in Economics MME 2010, Part I, České Budějovice*, pages 98–104, 2010.

[16] Michal Černý, Milan Hladík, and Veronika Skočdopolová. On computationally complex instances of the c-optimal experimental design problem: breaking RSA-based cryptography via c-optimal design. In Yves Lechevallier and Gilbert Saporta, editors, *Proceedings of Compstat 2010, Paris*, pages 879–886, 2010.

[17] Milan Hladík and Michal Černý. New approach to interval linear regression. In R. Kasımbeyli, C. Dinçer, S. Özpeynirci, and L. Sakalauskas, editors, *24th Mini-EURO Conference On Continuous Optimization and Information-Based Technologies in The Financial Sector MEC EurOPT 2010. Selected Papers*, pages 167–171, Vilnius, 2010. Technika.

[18] Milan Hladík. On necessary efficient solutions in interval multiobjective linear programming. In C. H. Antunes, D. R. Insua, and L. C. Dias, editors, *CD-ROM Proceedings of the 25th Mini-EURO Conference Uncertainty and Robustness in Planning and Decision Making URPDM 2010, April 15-17, Coimbra, Portugal*, pages 1–10, 2010.

[19] Milan Hladík. A contractor for the symmetric solution set. *WASET*, 71:94–99, 2010. Proceedings of the International Conference on Applied Mathematics and Engineering Mathematics, November 24-26, Venice, Italy.

[20] Milan Hladík. Tolerances in portfolio selection via interval linear programming. In P. Rehorova, K. Marsikova, and Z. Hubinka, editors, *CD-ROM Proceedings 26-th Int. Conf. Mathematical Methods in Economics MME08, Liberec, Czech Republic*, pages 185–191. Technical University Liberec, September 2008.

[21] Milan Hladík. Optimal value bounds in nonlinear programming with interval data. In L. Sakalauskas, G. W. Weber, and E. K. Zavadskas, editors, *Proceedings of the 20th international conference EURO Mini Conference: "Continuous Optimization and Knowledge-*

Based Technologies", EurOPT 2008, May 20-23, Neringa, Lithunia, pages 154–159, Vilnius, 2008. Technika.

[22] Milan Hladík. Separation of convex polyhedral sets with uncertain data. In *Proceedings 24-th Int. Conf. Mathematical Methods in Economics MME06, Pilsen*, pages 227–234, 2006.

[23] Ondřej Bojar, Cyril Brom, Milan Hladík, and Vojtěch Toman. The Project ENTs: Towards Modelling Human-like Artificial Agents. In *Proceedings of Student Research Forum, SOFSEM 2005, Liptovský Ján, Slovak Republic*, pages 1–12, 2005.

[24] Milan Hladík. Explicit description of all separating hyperplanes of two convex polyhedral sets with rhs-parameters. In Jana Šafránková, editor, *WDS 2004 - Proceedings of Contributed Papers, Part I, June 15-18, Matfyzpress, Prague*, pages 63–70, 2004.