Curriculum vitae of

Immanuel M. Bomze

Short biosketch

Immanuel M. Bomze was born in Vienna, Austria, in 1958. He received the degree *Magister rerum naturalium* in Mathematics at the University of Vienna in 1981. After a postgraduate scholarship at the Institute for Advanced Studies, Vienna from 1981 to 1982, he received the degree *Doctor rerum naturalium* (Ph.D.) in Mathematics at the University of Vienna. After his *Habilitation* 1987, he held several visiting research positions at various research institutions across Europe, the Americas, Asia and Australia. He also gained some practical Operations Research experience during his work as a research mathematician in the *Business & Marketing Research/Operations Research* group of the national incumbent telecommunication operator *Telekom Austria* 2002-2004. Since 2004, he holds a chair (full professor) of *Applied Mathematics and Statistics* at the University of Vienna.

Bomze's research interests are in the areas of nonlinear optimization, qualitative theory of dynamical systems, game theory, mathematical modelling and statistics, where he has edited one and published four books, as well as over 100 peer-reviewed articles in scientific journals and monographs. The list of his co-authors comprises over seventy scientists from more than a dozen countries in four continents. In 2014 he was elected *Fellow of EurOpt*, the Continuous Optimization Working Group of *EURO*, the Association of European Operational Research Societies https://www.euro-online.org/websites/continuous-optimization/.

As a member of program and/or organizing committees, he co-organized various scientific events and he is an Associate Editor for five international journals. For several science foundations and councils (based in Canada, the Czech Republic, Germany, Great Britain, Hong Kong, Israel, Italy, the Netherlands, Norway, Portugal, Singapore, Spain, USA), and for almost 50 scientific journals he acted as a reporting referee. 2011–2017 he served as an Editor (Co-EiC) of the European Journal of Operational Research, one of the worldwide leading journals in the field. Moreover, he serves as the Austrian Representative in the Management Committee of the European *COST Action CA16228 European Network for Game Theory*. Bomze co-founded the *Vienna Center of Operations Research (VCOR)* and serves as its co-director. As elected president of *EURO*, he commenced office in 2019 and will serve in this function until end of 2020, and in the *EURO* Executive Committee until end of 2021 (then as Past President).

Major scientific achievements

In his Ph.D. thesis, Immanuel Bomze completely classified all (more than 100 topologically different) possible flows of the *Generalized Lotka-Volterra dynamics* on the plane.

In the mid 1980's, Bomze helped to popularize the field of *Evolutionary Game Theory (EGT)*, among researchers in Economics and Social Sciences. While EGT received most attention within Theoretical Biology around 1980, its significance is now acknowledged in many more areas. Recently, EGT has been applied, e.g. to model evolution of social networks.

Around the turn of the millennium, Bomze coined, together with his co-authors, the now widely used terms *Standard Quadratic Optimization* and *Copositive Optimization* or *Copositive Programming*. While the further deals with the simplest problem class in non-linear optimization with an NP-hard complexity, Copositive Optimization allows a conic reformulation of these hard problems as a linear optimization problem over a closed convex cone of symmetric matrices, a so-called *Conic Optimization Problem*. In this type of problems, the full extent of complexity is put into the cone constraint, while structural constraints and also the objective function are linear and therefore easy to handle. Since this construction facilitates computation of tractable yet tight and rigorous bounds for multimodal optimization problems, it represents a powerful exact method for global optimization. Among the manifold applications of this approach are all (fractional) polynomial mixed-integer, and therefore also most combinatorial optimization problems, which in turn can be used in Analytics, Economics, Engineering, Data Science and Machine Learning, to name but a few.

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Chronological table

Education

1976–1982	studied Mathematics and Physics at University of Vienna
1981	Graduation (Mag. rer. nat.)
1981–1982	Ph.D. study (Mathematics) at University of Vienna
1981–1983	Postgraduate student at the Institute of Advanced Studies, Vienna
1982	Graduation (Dr. rer. nat.)
1987	Habilitation at the University of Vienna

Professional career and academic functions (selection)

1982–2002	Assistant/associate professor at Univ.Vienna
2002–2004	Research mathematician, Business & Market Research/OR Dept., Telekom Austria AG, Vienna
2003–2006	President of the Austrian Operations Research Society (OeGOR)
2004–now	Full professor (Chair of Applied Mathematics and Statistics), Univ. Vienna
2005–2006	Head of department
2006–2007	Vice dean of the Faculty of Business, Economics, and Statistics
2009–2018	Study director (Vize DSPL) of the "Abraham Wald" Ph.D. Program in Statistics and Operations Research
2017–now	Co-director, Vienna Center of Operations Research (VCOR)
2018–now	Study director (Vize SPL) for the Statistics Programs (Bachelor, Master)
2019–2020	President of $EURO$

Academic visits (selection)

1993, 1998	Visiting researcher, IIASA, Laxenburg
1994	Visiting fellow, Department of Economics, University of Melbourne
1995	Visiting researcher, Wilfrid Laurier University, Waterloo, Ontario
2004, 2008	Visiting professor, Università "La Sapienza", Roma
2001, 2004	Visiting professor, Università "Ca' Foscari", Venezia
2006/07, 2014	Visiting professor, Università della Calabria, Rende, Cosenza
2007	Visiting researcher, Universität (now TU) Dortmund
2007	Lecturer, CIME Summer School, Cetraro
2008, 2016/17	Visiting researcher, Universidad de Sevilla
2008	Visiting researcher, Program for Evolutionary Dynamics, Harvard University
2009	Visiting researcher, Universidade de Coimbra
2010, 2015	Visiting professor, Universidade Nova de Lisboa
2012	Visiting researcher, GERAD Montréal
2012, 2013	Visiting professor, Courant Institute, New York University
2012	Visiting researcher, Technion Haifa
2013	Visiting fellow, Cambridge University UK
2013, 2016	Visiting professor, Koç Üniversitesi Istanbul
2016	Visiting professor, Universidade de São Paulo
2016	Visiting fellow, IMPA Rio de Janeiro
2016	Visiting researcher, University of NSW Sydney
2016	Visiting professor, Singapore University of Technology and Design

Publications

Books

[1] *Nonlinear Optimization* (I.B., V. Demyanov, R. Fletcher, T. Terlaky, I. Pólik; editors: G. Di Pillo, F. Schoen). Lecture Notes in Mathematics 1989. Springer, New York (2010).

[2] *Developments in Global Optimization* (I.B., T. Csendes, R. Horst, P. Pardalos, editors). Kluwer, Dordrecht (1997).

[3] *A functional analytic approach to statistical experiments.* Pitman Research Notes in Mathematics **237**. Longman, London (1990).

[4] *Game theoretic foundations of evolutionary stability* (I.B., B.M. Pötscher). Springer, Berlin (1989).

Publications in peer reviewed outlets (periodicals and edited books)

[5] First-order methods for the impatient: support identification in finite time with convergent Frank-Wolfe variants (I.B., F. Rinaldi, S. Rota Bulò). To appear in: *SIAM Journal on Optimization* (2019).

[6] A Hessian barrier algorithm for linearly constrained optimization problems (I.B., P. Mertikopoulos, W. Schachinger, M. Staudigl). To appear in: *SIAM Journal on Optimization* (2019).

[7] Pure infectionimmunization dynamics for partnership games: a correction (I.B., F. Rinaldi, S. Rota Bulò). *Games and Economic Behaviour* **114**, 315–317 (2019).

[8] Notoriously hard (mixed-)binary QPs: empirical evidence on new completely positive approaches (I.B., J. Cheng, P.J.C. Dickinson, A. Lisser, J. Liu). *Computational Management Science*, doi.org/10.1007/s10287-018-0337-6 (2018).

[9] On minimal Hölder gaps and Shannon entropy balance. *Portugaliae Mathematica* **75**, 1–10 (2018).

[10] Extended trust region problems over one or two balls: exact (semi-)Lagrangian relaxations (I.B., V. Jeyakumar, G. Li). *Journal of Global Optimization* **71**, 551–569 (2018).

[11] Building a completely positive factorization. *Central European Journal of Operations Research* **26**, 287–305 (2018).

[12] The complexity of simple models – a study of worst and typical hard cases for the Standard Quadratic Optimization Problem (I.B., W. Schachinger, R. Ullrich). *Mathematics of Operations Research* **43**, 651–674 (2018).

[13] Robust spherical separation (A. Astorino, I.B., A. Fuduli, M. Gaudioso). *Optimization* **66**, 925–938 (2017).

[14] A fresh CP look at mixed-binary QPs: new formulations and relaxations (I.B., J. Chen, P.J.C. Dickinson, A. Lisser). *Mathematical Programming* **166**, 159-184 (2017).

[15] Copositivity for second-order optimality conditions in general smooth optimization problems. *Optimization* **65**, 779–795 (2016).

[16] Copositive relaxation beats Lagrangian dual bounds in quadratically and linearly constrained QPs. *SIAM Journal on Optimization* **25**, 1249-1275 (2015).

[17] The structure of completely positive matrices according to their CP-rank and CP-plus-rank (I.B., P.J.C. Dickinson, G. Still). *Linear Algebra and its Applications* **482**, 191–206 (2015).

[18] Copositivity-based approximations for mixed-integer fractional quadratic optimization (P.A. Amaral, I.B.). *Pacific Journal of Optimization* **11**, 225–238 (2015).

[19] Narrowing the difficulty gap for the Celis-Dennis-Tapia problem (I.B., M. Overton). *Mathematical Programming* **151**, 459–476 (2015).

[20] New lower bounds and asymptotics for the cp-rank (I.B., W. Schachinger, R. Ullrich). *SIAM Journal on Matrix Analysis and Applications* **36**, 20–37 (2015).

[21] New results on the cp rank and related properties of co(mpletely)positive matrices (N. Shaked-Monderer, A. Berman, I.B., F. Jarre, W. Schachinger). *Linear and Multilinear Algebra* **63**, 384–396 (2015).

[22] From seven to eleven: completely positive matrices with high cp-rank (I.B., W. Schachinger, R. Ullrich). *Linear Algebra and its Applications* **459**, 208–221 (2014).

[23] Rounding on the standard simplex: regular grids for global optimization (Best Paper Award; I.B., S. Gollowitzer, E.A. Yıldırım). *Journal of Global Optimization* **59**, 243–258 (2014).

[24] Copositivity and constrained fractional quadratic problems (P. Amaral, I.B., J. Júdice). *Mathematical Programming* **146**, 325–350 (2014).

[25] Constraint Selection in a Build-Up Interior-Point Cutting-Plane Method for Solving Relaxations of the Stable-Set Problem (A. Engau, M.F. Anjos, I.B.). *Mathematical Methods of Operations Research* **78**, 35–59 (2013).

[26] On the cp-rank and minimal cp factorizations of a completely positive matrix (N. Shaked-Monderer, I.B., F. Jarre, W. Schachinger). *SIAM Journal on Matrix Analysis and Applications* **34**, 355-368 (2013).

[27] Copositivity detection by difference-of-convex decomposition and ω-subdivision (I.B., G. Eichfelder). *Mathematical Programming* **138**, 365–400 (2013).

[28] Two spherical separation procedures via non-smooth convex optimization (A. Astorino, I.B., M.P. Brito, M. Gaudioso). In: V. de Simone, D. di Serafino, and G. Toraldo (eds.), Recent advances in nonlinear optimization and equilibrium problems: a tribute to Marco D'Apuzzo, Quaderni di Matematica, Dipartimento di Matematica, Seconda Universit degli Studi di Napoli, Vol. 27, Aracne, ISBN 978-88-548-5687-5 (2012).

[29] Standard bi-quadratic optimization problems and unconstrained polynomial reformulations (I.B., Ch. Ling, L. Qi, X. Zhang). *Journal of Global Optimization* **52**, 663-687 (2012).

[30] Copositive optimization - recent developments and applications. *European Journal of Operational Research* **216**, 509–520 (2012).

[31] Unconstrained formulation of standard quadratic optimization problems (I.B., L. Grippo, L. Palagi). *TOP* **20**, 35–51 (2012).

[32] Separable standard quadratic optimization problems (I.B., M. Locatelli). *Optimization Letters* **6**, 857–866 (2012).

[33] Think co(mpletely)positive ! Matrix properties, examples and a clustered bibliography on copositive optimization (I.B., W. Schachinger, G. Uchida). *Journal of Global Optimization* **52**, 423–445 (2012).

[34] A first-order interior-point method for linearly constrained smooth optimization (P. Tseng, I.B., W. Schachinger). *Mathematical Programming* **127**, 399–424 (2011).

[35] Quadratic factorization heuristics for copositive programming (I.B., F. Jarre, F. Rendl). *Mathematical Programming Computation* **3**, 37–57 (2011).

[36] Graph-Based Quadratic Optimization: A Fast Evolutionary Approach (S. Rota-Bulò, M. Pelillo, I.B.). *Computer Vision and Image Understanding* **115**, 984–995 (2011).

[37] Infection and immunization: a new class of evolutionary game dynamics (S. Rota-Bulò, I.B.). *Games and Economic Behavior* **71**, 193–211 (2011).

[38] Solving two-stage stochastic Steiner tree problems by two-stage branch-and-cut. (I.B., M. Chimani, M. Jünger, I. Ljubic, P. Mutzel, B. Zey). In: O. Cheong, K.-Y. Chwa, and K. Park (eds.), ISAAC 2010, Part I, Lecture Notes in Computer Science 6506, pp. 427–439. Springer, Heidelberg (2010).

[39] Fast population game dynamics for dominant sets and other quadratic optimization problems (S. Rota-Bulò, M. Pelillo, I.B.). In: E.R. Hancock, R.C. Wilson, T. Windeatt, I. Ulusoy, and F. Escolano (eds.), Structural, Syntactic, and Statistical Pattern Recognition, SSPR & SPR 2010, Lecture Notes in Computer Science 6218, pp. 275–285. Springer, Heidelberg (2010).

[40] Necessary conditions for local optimality in difference-of-convex programming (I.B., C. Lemaréchal). *Journal of Convex Analysis* **17**, 673–680 (2010).

[41] A note on Burer's copositive representation of mixed-binary QPs (I.B., F. Jarre). *Optimization Letters* **4**, 465–472 (2010).

[42] Gap, cosum, and product properties of the θ' bound on the clique number (I.B., F. Frommlet, M. Locatelli). *Optimization* **59**, 1041–1051 (2010).

[43] Copositivity cuts for improving SDP bounds on the clique number (I.B., F. Frommlet, M. Locatelli). *Mathematical Programming* **124**, 13–32 (2010).

[44] Multi-Standard Quadratic optimization problems: interior point methods and cone programming reformulation (I.B., W. Schachinger). *Computational Optimization and Applications* **45**, 237–256 (2010).

[45] A conic duality Frank-Wolfe type theorem via exact penalization in quadratic optimization (W. Schachinger, I.B.). *Mathematics of Operations Research* **34,** 83–91 (2009).

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[47] One-third rules with equality: second-order evolutionary stability conditions in finite populations (I.B., C. Pawlowitsch), *Journal of theoretical Biology* **254**, 616–620(2008).

[48] Perron-Frobenius property of copositive matrices, and a block copositivity criterion. *Linear Algebra Appl.* **429**, 68–71 (2008).

[49] New and old bounds for standard quadratic optimization: dominance, equivalence and incomparability (I.B., M. Locatelli, F. Tardella). *Mathematical Programming* **115**, 31–64 (2008).

[50] New results for molecular formation under pairwise potential minimization (W. Schachinger, B. Addis, I.B., F. Schoen). *Computational Optimization and Applications* **38**, 329–349 (2007).

[51] Improved SDP bounds for minimizing quadratic functions over the ℓ^1-ball (I.B., F. Frommlet, M. Rubey). *Optimization Letters* **1**, 49–59 (2007).

[52] Optimization of functions with rank-two variation over a box. *European Journal of Operational Research* **161**, 181–205 (2005).

[53] Quartic formulation of standard quadratic optimization problems (I.B., L. Palagi). *Journal of Global Optimization* **32**, 523–617 (2005).

[54] Portfolio selection via replicator dynamics and projections of indefinite estimated covariances. *Dynamics of Continuous, Discrete and Impulsive Systems* **B 12**, 527–564 (2005).

[55] A characterization of undominated d.c. decompositions of quadratic functions (I.B., M. Locatelli). *Computational Optimization and Applications* **28**, 227–245 (2004).

[56] Hyper sensitivity analysis of portfolio optimization problems (with L. Churilov, D. Ralph, M. Sniedovich). *Asia Pacific Journal of Operations Research* **21**, 297–317 (2004).

[57] The combinatorics of pivoting for the maximum weight clique (M. Locatelli, I.B., M. Pelillo). *Operations Research Letters* **32**, 523–529 (2004).

[58] Ellipsoidal approach to box-constrained quadratic problems (P. De Angelis, I.B., G. Toraldo). *Journal of Global Optimization* **28**, 1–15 (2004).

[59] Regularity vs. degeneracy in dynamics, games, and optimization: a unified approach to different aspects. *SIAM Review* **44**, 394-414 (2002).

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[61] Annealed replication: A new heuristic for the maximum clique problem (I.B., M. Budinich, M. Pelillo, C. Rossi). *Discrete Applied Mathematics* **121**, 27–49 (2002).

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[63] Branch-and-Bound Approaches to Standard Quadratic Optimization Problems. *Journal of Global Optimization* **22**, 17–37 (2002).

[64] Quadratic Optimization: Standard Problems I - Theory. In: C.A. Floudas, P.M. Pardalos (Eds.), *Encyclopedia of Optimization*, Vol. 5, 270–272 (2001).

[65] Quadratic Optimization: Standard Problems II - Theory. In: C.A. Floudas, P.M. Pardalos (Eds.), *Encyclopedia of Optimization*, Vol. 5, 266–268 (2001).

[66] Quadratic Optimization: Standard Problems III - Theory. In: C.A. Floudas, P.M. Pardalos (Eds.), *Encyclopedia of Optimization*, Vol. 5, 268–270 (2001).

[67] On copositive programming and standard quadratic optimization problems (I.B., M. Dür, E. De Klerk, A. Quist, C. Roos, T. Terlaky). *Journal of Global Optimization* **18**, 301–320 (2000).

[68] Approximating the maximum weight clique using replicator dynamics (I.B., M. Pelillo, V. Stix). *IEEE Transactions on Neural Networks* **11**, 1228–1241 (2000).

[69] A new "annealed" heuristic for the maximum clique problem (I.B., M. Budinich, M. Pelillo, C. Rossi). In: P.M. Pardalos (Ed.), *Approximation and Complexity in Numerical Optimization: Continuous and Discrete Problems*, 78–96. Kluwer, Dordrecht (2000).

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[71] Linear-time detection of copositivity for tridiagonal matrices and extension to block-tridiagonality. *SIAM Journal on Matrix Analysis and Applications* **21**, 840 – 848 (2000).

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[73] Genetic engineering via negative fitness: evolutionary dynamics for global optimization (I.B., V. Stix). *Annals of OR* **89**, 297–318 (1999).

[74] On standard quadratic optimization problems. *Journal of Global Optimization* **13**, 369–387 (1998).

[75] Replicator dynamics for the evolution towards the maximum clique: variants and experiments (I.B., F. Rendl). In: R. De Leone, A. Murlì, P.M. Pardalos, G. Toraldo (Eds.), *High Performance Algorithms and Software in Nonlinear Optimization*, 53–67. Kluwer, Dordrecht (1998).

[76] Uniform barriers and evolutionarily stable sets. In: W. Leinfellner, E. Köhler (Eds.), *Game Theory, Experience, Rationality*, 225–244. Kluwer, Dordrecht (1998).

[77] Global escape strategies for maximizing quadratic forms over a simplex. *Journal of Global Optimization* **11**, 325–338 (1997).

[78] The L-space of a statistical experiment. In: M. Hazewinkel (ed.), *Encyclopaedia of Mathematics*, Supplementary Vol. **1**, 345–346. Kluwer, Dordrecht (1997).

[79] Evolution towards the maximum clique. *Journal of Global Optimization* **10**, 143–164 (1997).

[80] Evolutive versus Naive Bayesian Learning (I.B., J. Eichberger). In: C. Bicchieri, R. Jeffrey, B. Skyrms (Eds.), *The Dynamics of Norms.* Cambridge Studies in Probability, Induction and Decision Theory, pp. 109–130, Cambridge University Press (1997).

[81] Evolutionary approach to the maximum clique problem: empirical evidence on a larger scale (I.B., M. Pelillo, R. Giacomini). In: I.Bomze, T.Csendes, R.Horst, P.Pardalos (Eds.), *Developments in Global Optimization*, pp. 95–108. Kluwer, Dordrecht (1997).

[82] Block pivoting and shortcut strategies for detecting copositivity. *Linear Algebra and its Applications* **248**, 161–184 (1996).

[83] Parallelizable evolutionary dynamics principles for solving the maximum clique problem (I.B., M. Pelillo). In: H.-M. Voigt, W. Ebeling, I. Rechenberg, H.-P. Schwefel (Eds.), *Parallel Problem Solving from Nature – PPSN IV*, 676–685. Springer, Berlin (1996).

[84] Stationary distributions under mutation-selection balance: structure and properties (R. Bürger, I.B.). *Advances in Applied Probability* **28**, 227–251 (1996).

[85] Evolutionary stability is not a foolish game. *Central European Journal of OR and Economics* **4**, 26–56 (1996).

[86] Does neutral stability imply Lyapunov stability? (I.B., J.W. Weibull). *Games and Economic Behaviour* **11**, 173–192 (1995).

[87] Estimating qualification in a self-evaluating group (W. Gutjahr, I.B.). *Quality and Quantity* **29**, 241–250 (1995).

[88] Checking positive-definiteness by three statements. *International Journal on Mathematical Education in Science and Technology* **26**, 289–294 (1995).

[89] Stability by mutation in evolutionary games (I.B., R. Bürger). *Games and Economic Behaviour* **11**, 146–172 (1995).

[90] Lotka-Volterra equation and replicator dynamics: new issues in classification. *Biological Cybernetics* **72**, 447–453 (1995).

[91] The dynamics of self-evaluation (I.B., W. Gutjahr). *Applied Mathematics and Computation* **64**, 47–63 (1994).

[92] Generalized convexity for second-order optimality conditions (I.B., G. Danninger). In: S. Komlósi, T. Rapcsák, S. Schaible (Eds.), *Generalized Convexity*, pp. 137–144. Springer, Berlin (1994).

[93] A finite algorithm for solving general quadratic problems (I.B., G. Danninger). *Journal of Global Optimization* **4**, 1–16 (1994).

[94] On the balance between mutation and frequency-dependent selection in evolutionary game dynamics (I.B., R. Bürger). In: Ph. Clément, E. Lumer (Eds.), *Evolution Equations, Control Theory and Biomathematics*, 11–23. Marcel Dekker, New York (1993).

[95] "On the definition of an evolutionarily stable strategy in the playing the field model" by V.P. Crawford (I.B., B. Pötscher). Letter to the editor, *Journal of theoretical Biology* **161**, 405 (1993).

[96] A global optimization algorithm for concave quadratic problems (I.B., G. Danninger). *SIAM Journal on Optimization* **3**, 826–842 (1993).

[97] Behaviour of the length test for medium sample sizes (R. Dittrich, E. Reschenhofer, I.B.). *Communications in Statistics: Theory and Methods* **22**, 2517–2525 (1993).

[98] Using copositivity for global optimality criteria in concave quadratic programming problems (G. Danninger, I.B.). *Mathematical Programming* **62**, 575–580 (1993).

[99] A dynamical characterization of evolutionarily stable states (I.B., E. Van Damme). *Annals of OR* **37**, 229–244 (1992).

[100] Detecting all evolutionarily stable strategies. *Journal of Optimization Theory and Applications* **75**, 313–329 (1992).

[101] Copositivity conditions for global optimality in indefinite quadratic programming problems. *Czechoslovak Journal of Operations Research* **1**, 7–19 (1992).

[102] Testing for white noise against multimodal spectral alternatives (E. Reschenhofer, I.B.). *Journal of Time Series Analysis* **13**, 435–439 (1992).

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a. — , Amendments and Corrections (E. Reschenhofer, I.B.). *Biometrika* **79**, 859 (1992).

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[106] Copositivity and optimization. In: P. Kleinschmidt, F.J. Radermacher (Eds.), *Proc. 12th SOR* (*Methods in OR* **58**), pp. 27–36, Athenäum, Frankfurt/Main (1988).

[107] A note on aspirations in non-transferable utility games. *International Journal of Game Theory* **17**, 193–200 (1988).

[108] Remarks on the recursive structure of copositivity. *Journal of Information & Optimization Sciences* **8**, 243–260 (1987).

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[110] Measurable supports, reducible spaces and the structure of the optimal σ-field in unbiased estimation. *Monatshefte für Mathematik* **101**, 27–38 (1986).

[111] Lotka-Volterra equation and replicator dynamics: a two-dimensional classification. *Biological Cybernetics* **48**, 201–211 (1983).

[112] The role of Mendelian genetics in strategic models on animal behaviour (I.B., P. Schuster und K. Sigmund). *Journal of theoretical Biology* **101**, 19–38 (1983).

Other professional activities (selection)

Editor (Co-Editor-in-Chief) of *European Journal of Operational Research* (2011-2017)

Editor (Member of Editorial Board) of

Central European Journal of Operations Research,
European Journal of Operational Research,
Journal of Global Optimization,
Optimization Letters,
Operations Research Perspectives

Member of the Management Committee of the COST Action CA16228 *European Network for Game Theory* `http://www.cost.eu/COST_Actions/ca/CA16228`.

Co-founder and co-director of the *Vienna Center of Operations Research (VCOR)* `http://vcor.univie.ac.at/home/`.

President of *EURO* `https://www.euro-online.org/web/pages/1/home`.

Reporting Referee for the agencies

Consiglio Nazionale delle Ricerche (CNR), Italy,
National Environment Research Council (NERC), U.K.,
National Science Foundation (NSF), U.S.A.,
Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO), The Netherlands,
German-Israeli Foundation for Scientific Research and Development (GIF),
Research Grants Council of Hong Kong, China,
Canadian Institutes of Health Research (CIHR), Natural Sciences & Engineering Research Council (NSERC), Social Sciences & Humanities Research Council (SSHRC), Canada.

and for the journals

Advances in Complex Systems,
Annals of Operations Research,
Biological Cybernetics,
Central European Journal of Operations Research (and Economics),
Computational and Mathematical Organization Theory,
Computational Optimization and Applications,
Computational Statistics and Data Analysis,
Computer Vision and Image Understanding,
Discrete Applied Mathematics,
Discrete Optimization,
Econometrica,
Electronic Journal of Linear Algebra,
European Journal of Operational Research,
European Journal of Political Economy,
Games,
Games and Economic Behaviour,
IEEE Transactions on Neural Networks,
IEEE Transactions on Pattern Analysis and Machine Intelligence,
IEEE Transactions on Signal Processing,
Il Nuovo Cimento B,
Information Sciences,
International Game Theory Review,
International Journal of Game Theory,
Journal of Combinatorial Optimization,
Journal of Computational and Applied Mathematics,
Journal of Econometrics,
Journal of Economic Theory,
Journal of Global Optimization,
Journal of Mathematical Analysis and Applications,
Journal of Mathematical Biology,
Journal of Optimization Theory and Applications,
Linear Algebra and its Applications,
Linear and Multilinear Algebra,
Mathematical Methods of Operations Research,
Mathematical Methods of Statistics,
Mathematical Programming,
Mathematical Social Sciences,
Mathematics of Operations Research,
Monatshefte für Mathematik,
Operational Research,
Numerical Algorithms,
Optimization,
Optimization and Engineering,
Optimization Letters,
Optimization Methods and Software,
OR Spektrum - Quantitative Approaches in Management,

Pattern Recognition,
Proceedings of the Royal Society: Mathematical and Physical Sciences,
Scandinavian Journal of Statistics,
SIAM Journal on Optimization,
SIAM Review,
Statistics & Decisions,
Statistics & Probability Letters.