

Michael Šebek CV

2017-06-25 /long/ eng



Born: 1954 Prague, Czech Republic - Czech citizen

University Degrees and Titles:

- 2004, Prof., Control Engineering, Czech Technical University in Prague (CVUT)
- 2003, Doc., Control Engineering, Czech Technical University in Prague
- 1995, DrSc., Control Engineering, Academy of Sciences of the Czech Republic
- 1981, CSc., Control Engineering, Czechoslovak Academy of Sciences
- 1978, Ing., Electrical Engineering, Czech Technical University in Prague

Professional Career:

- Czech Technical University in Prague (Head of the Department of Control Engineering, 2003 - present; Czech Institute for Informatics, Robotics and Cybernetics, Head of Cyber-Physical Systems Department, 2014 - present)
- Institute of Information Theory and Automation, Academy of Sciences of the Czech Republic (1979 – 2011), various positions, for many years Head of the Control Theory Department
- PolyX, Ltd., Prague (Founding Partner, CEO, 1999 – present)
- Center for Applied Cybernetics - huge R&D consortium participated by eight academic institutions, seven industrial companies and five end-user firms (Manager, 2000-2012)

Visiting Positions:

- Swiss Federal Institute of Technology (ETH) Zürich, Visiting Fellow, Switzerland, (1994-95)
- University of Twente, Netherlands, Researcher (1990-91)
- University of Toronto, Canada, Visiting Fellow (1989)
- Starthclyde University, Scotland, Visiting Fellow (1986)
- University of Padova, Italy, Visiting Fellow (1985)

Industry and Industrial Applications

- Co-founder and CEO of PolyX, Ltd., Prague (Official Partner of the MathWorks, Inc. USA.)
- Development team leader of the Polynomial Toolbox for Matlab versions 1.5 (1996) and 1.6 (1997): A popular freeware for polynomial methods with more than 1500 installations worldwide (including Boeing, DaimlerChrysler, Ericsson, Ford, France Telecom, Kodak, PGE, Renault).
- Responsible for product development in of the Polynomial Toolbox 2.0 (1999), 2.5 (2001), 3.0 (2012): A commercial toolbox for Matlab, over 2000 licenses sold. Customers include corporations – such as Lockheed Martin, USA; Mitsubishi Electric, J; Saudi Aramco, KSA; SANDIA Lab. USA, Petro Bras, BR; DaimlerChrysler, D – as well as hi-tech firms – such as Cybernet Systems Co., J; Compureg, CZ; ProCS, SK. Prestigious universities clients include Princeton, Notre Dame, Brown, Texas, Florida, Waterloo, Hong Kong, Kobe, ETH, KTH, Glasgow, Technion and many others. Notable customers also come from the military sector, for example, US Air Force, QinetiQ and UK Ministry of Defense.

Research Interests:

- Control and decision of dynamic networks (energy, physical, communication)
- Control design for systems of systems, cyber-physical systems, multi-agent systems and robotic formations
- Robust and optimal control
- Linear systems and control; 2-D/n-D systems; Time-delay systems
- Control and communication systems design algorithms and software
- Polynomials, Polynomial matrices, and equations; Linear matrix inequalities

Publications and citations

- Over 300 research papers and reports, 62 in international impacted journals, almost half of them in the two very best journals in automatic control: *IEEE Transactions on Automatic Control* (18) and *Automatica* (6)
- *Web of Science by Thomson Reuters*: 110 papers, 62 in impacted journals (IF in the 1st Decile D1 26, by Quartiles Q1 37; Q2 8; Q3 2; Q4 15), 664 citations on Researcher ID, 557 hetero-citations found via General Search, 633 hetero-citations found via Cited Reference Search. H-index 14 (listed)
- Performance comparison in WoS category AUTOMATION & CONTROL SYSTEMS: Among one-thousandth (1/1000) of world researchers by h-index. The second best h-index among CZ scientists in automatic control.
- *Scopus*: 130 documents, H-index 13 (without direct and indirect autocitations), 672 hetero-citations
- *Google Scholar*: papers 285, citations 2076, h-index 20, i10-index 51
- www.researcherid.com/rid/F-5360-2011 ; orcid.org/0000-0003-0927-2988

International Projects Leader

- Coordinator of EC project ARRAYCON OK7X 605087 - Application of distributed control on smart structures – European Industrial Doctorate, 2013-17, with LMS International/Siemens, B
- Czech Section Leader of the European Erasmus Mundus project SpaceMaster (2005-)
- Coordinator of EC project CP97:7010: EUROPOLY – European Network Of Excellence for Industrial Applications of Polynomial Methods, 1998-01, with 14 industrial and academic internal members (NL, GB, S, I, F, CZ, SK) and dozens of external members such as Ericsson and DaimlerChrysler.
- Czech team leader of the EC project CP93:2424, 1994-7, with University of Twente, NL
- Czech group leader of NATO project PST.CLG.978481.(2001-2), with LAAS-CNRS Toulouse, F
- Czech team head of the German (DFG) and Czech (GACR- GC13-12726J) joint project Unified framework for multi-criteria identification, control and fault detection (2013-2015), with University Bochum, D
- Czech group leader in the Czech-American AmVis project COLA4CON (ME10010) with the University of Texas at Arlington
- numerous other bilateral projects lead with partners from USA, Japan, Austria, France, Italy, and Greece

National Projects Leader

- MPO 1H-PK/22 technology transfer project (jointly with Honeywell)
- GAČR: 103/12/1794 GA102/08/0186, GA102/05/0011, GAČR 102/02/0709, GAČR 102/99/1368, all rated Excellent.
- Control Engineering Dept. Team leader in the Research Programs MSM 212300013 and MSM6840770038
- Manager of the Center for Applied Cybernetics (1M0567), consisting of 14 partners whose subject of activity is applied and industrial research in the field of cybernetics
- numerous minor projects

Industrial Research Contracts Lead or Supervised

- Contracted research of the Department with Honeywell, Porsche, Volkswagen Wolfsburg, Škoda Auto, EATON, Siemens, ČEPS, and others.

Teaching and related activities

- Ph.D. students: Eva Žáčková, Ivo Herman, Jan Zábajník, Štefan Knotek, Xueji Zhang, Zhong Zhe Dong
- Ph.D. graduates: Didier Henrion, Martin Hromčík, Zdeněk Hurák, Petr Urban, Lukáš Ferkl, Pavel Zezula, Petr Kujan, Sam Privara, Zdeněk Váňa, Dan Martinec
- Ph.D. students publish in top journals (Q1 WoS) typically achieving tens WoS hetero-citations and h-index 2-4 before the defense. Former Ph.D. graduates themselves have already risen over 10 Ph.D. students.
- Responsible for the Cybernetics and Robotics program at CVUT, 2015-, Authorial team leader for its new version recently re-accredited.
- Originator and guarantor of the Study branch Systems and control at CVUT, 2009-
- Lecturer of bachelor courses: Robots, Automatic Control, Systems, and Control.

- Lecturer of master courses at CVUT: Robust Control, Nonlinear Systems, Modern Control Theory; at University Hamburg-Hartburg, D: Polynomial Methods in Control Design (2003)
- Lecturer of master courses at CVUT: Robust Control, Numerical Algorithms for Control Design, Algebraic Control Theory; at IfA, ETH Zurich: Polynomial Methods in Robust Control (1994), n-D Systems, (1995); in Belgium Graduate School in Control: Polynomial Methods in Control.
- Single or short series lectures at numerous universities in Europe, America, Asia, and Africa.

Professional Societies

- Institute of Electrical and Electronics Engineers IEEE, Control Systems Society CSS: Conference Editorial Board Member; Founding Chair of the Czech Chapter; Founding Board Member of the Czechoslovak Section;
- International Federation of Automatic Control IFAC: Council Member; Award Committee; Policy Committee Vice Chair; Administrative and Finance Committee; various Technical Committees member: Robust Control, Control Design, Transportation Systems
- European Control Association EUCA: Council Member; European Journal of Control, Associate Editor.

Editorial Boards

- Section Editor of *Encyclopedia of Systems and Control*, Springer; printed and on-line version since 2015
- Associate Editor, *European Journal of Control*, 2002-5
- IEEE CSS Conference Editorial Board Member, 1997-2002

Boards, Councils, Panels

- Chairman of the Expert Panel for Technical and Computer Sciences, Czech Government Council for Research and Development, 2014-
- Advisory Board for Space Activities, Czech Ministry of Transportation, 2013-
- Science Board Member, Masaryk University, Brno, 2017-
- Scientific Board Member: Technical University in Liberec, 2002-10; Faculty of Mechatronics TUL, 2009-
- CIIRC CVUT Science Council Member, 2015-
- Doctoral Studies Council Member: Faculty of Mechatronics, TUL, Liberec, 2009-; Faculty of Applied Science, TBU, Zlin, 2005-10.

International Conference Organization

- General Manager of the 16. IFAC World Congress, 2005 – over 2500 participants, till then the largest and most successful event in automatic control in the world
- General Chair, IEEE CACSD 2004, Taipei, Taiwan
- Regular IPC member of many IEEE, IFAC, and other conferences
- Conference Editorial Board Member of the IEEE CSS, preparing major conferences (CDC and ACC)

Awards and Distinctions:

- Werner von Siemens Best Educator Prize, Siemens CZ (2016)
- Deans Award for the Best Lecturer of a Compulsory Course, FEL CVUT (2015)
- Rector's Award for the Best Research Publication, CVUT (2010)
- National Prize of the Czech Republic for Research (1989)
- Czech Young Scientist Award (1986)

Public activities

- Founder, leader, and promoter of the Czech RoboRace, nationwide Lego-robotic competition for children and teenagers – regularly over sixty primary school teams and over hundred sixty high school teams. Covered by major TVs and other media. Learn more at <https://robosoutez.fel.cvut.cz/>.
- Science communicator in various media; Lectures, talk shows and texts for the general public on robotics, digitalization, science, technology and their future impact on the society.

Ten Most Cited Papers

- Henrion D - Šebek M - Kučera V: Positive polynomials and robust stabilization by fixed-order controllers. *IEEE Transactions on Automatic Control*, 48 (7), 1178-86, 2003 - *WoS Q1*, 98 hetero-citations
- Henrion D – Tarbouriech S - Šebek M: Rank-one LMI Approach to Simultaneous Stabilization of Linear Systems. *Systems & Control Letters*. 38(11), 79-89, 1999. *WoS Q2*, 66 hetero-citations
- Kwakernaak H - Šebek M: Polynomial J-spectral factorization. *IEEE Transactions on Automatic Control*, 39, 315-328, 1994. *WoS Q1*, 61 hetero-citations
- Kučera V - Šebek M: On deadbeat controllers. *IEEE Transactions on Automatic Control*, 29, 719-722, 1984. *WoS Q1*, 30 hetero-citations
- Henrion D - Arzelier D - Peaucelle D - Šebek M: An LMI Condition for Robust Stability of Polynomial Matrix Polytopes. *Automatica*, 37, 461-468, 2001. *WoS Q1*, 31 hetero-citations
- Šebek M: 2-D exact model matching. *IEEE Transactions on Automatic Control*, 28, 215-217, 1983. *WoS Q1*, 18 hetero-citations
- Šebek M: Polynomial Design of Stochastic Tracking-Systems. *IEEE Transactions on Automatic Control*. 1982, 27(2), 468-470. *WoS Q1*, 15 hetero-citations
- Šebek M: On 2-D pole placement. *IEEE Transactions on Automatic Control*, vol. AC-30, pp. 819-722, Aug. 1985. *WoS Q1*, 14 hetero-citations
- Šebek M: Polynomial Solution of 2-D Kalman-Bucy Filtering Problem. *IEEE Transactions on Automatic Control*. 1992, 37(10), 1530-1533. *WoS Q1*, 15 hetero-citations
- Henrion D – Šebek M: Reliable numerical methods for polynomial matrix triangularization. *IEEE Transactions on Automatic Control*, 44 (3), 497-508, 1999. *WoS Q1*, nine hetero-citations

Ten Most Recent Papers

- Herman I - Martinec D - Hurák Z - Šebek M: Scaling in bidirectional platoons with dynamic controllers and proportional asymmetry. *IEEE Transactions Automatic Control*, 62 (4), 2034-2040, 2017. *WoS D1*
- Herman I - Martinec D - Hurák Z - Šebek M: Nonzero bound on Fiedler eigenvalue causes exponential growth of H-infinity norm of the vehicular platoon. *IEEE Transactions on Automatic Control*, 60 (8), 2248 - 2253, 2015. *WoS D1*
- Hengster-Movric K - Lewis FL – Sebek M: Distributed Static Output-feedback Control for State Synchronization in Networks of Identical LTI Systems, *Automatica*, 53, 282–290, 2015. *WoS D1*
- Hengster-Movric K - Lewis FL - Šebek M - Vyhlídal T: Cooperative Synchronization Control for Agents with Control Delays: A Synchronizing Region Approach, *Journal of the Franklin Inst*, 352 (5), 2002-28, 2015. *Q1*
- Hengster-Movric K - Šebek M - Čelikovský S: Structured Lyapunov Functions for Synchronization of Identical Affine-in-control Agents - Unified Approach. *Journal of the Franklin Instit*, 353 (14), 3457–3486, 2016. *WoS Q1*
- Pčolka M - Žáčková E - Robinett R - Šebek M: Bridging the gap between the linear and nonlinear predictive control: Adaptations for efficient building climate control. *Control Eng. Practice*, 53, 124-138 2016. *WoS Q1*
- Martinec D - Herman I - Šebek M: A traveling wave approach to a multi-agent system with a path-graph topology. *Systems & Control Letters* 99, 90–98, 2017.
- Zhang X - Hengster-Movric K - Sebek M – Desmet W – Cassio F: Distributed Observer and Controller Design for Spatially Interconnected Systems. 2017 IEEE Conference on Control Technology and Applications, Kohala Coast, Hawai'i, USA, August 27-30, 2017.
- Dong ZZ - Desmet W - Cassio F - Hromcik M – Pluymers B - Sebek M: Equivalent force modeling of macro fiber composite actuators integrated into non-homogeneous composite plates for dynamic applications Submitted for publication, *Smart Materials and Structures*.
- Yaghmaie FA - Hengster-Movric K - Lewis FL – Su R - Šebek M: H_∞ Output Regulation of Linear Heterogeneous Multi-agent Systems over Switching Networks. Submitted to *Int. J. Robust. Nonlinear Control* 2017; 00:1–17

Learn more at the personal web www.michaelsebek.cz.