

Miloslav Čapek

Curriculum Vitae (January 14, 2026)

Saarinenova 11
Prague, 198 00, Czech Republic
☎ (+420) 777 899 512
✉ miloslav.capek@fel.cvut.cz
📧 capek.elmag.org
ORCID: 0000-0002-7442-889X
ResearcherID: H-6674-2014



Full Professor at Czech Technical University in Prague

Scientific interests

Electromagnetic field theory, electrically small antennas, fundamental bounds, computational electromagnetics, numerical and optimization techniques, inverse design, HPC in MATLAB.

Education

- Sept. 2009 – **Philosophiæ doctor in Radioelectronics**, *Modal Analysis and Optimization of Radiating Planar Structures*.
July 2014
Dept. of Electromagnetic Field, Faculty of Electrical Engineering, Czech Technical University in Prague, Czech Republic
- Sept. 2007 – **Master of Science in Telecommunication Engineering and Radioelectronics**, *Tools for modal analysis of fractal patch antennas (in Czech)*.
May 2009
Dept. of Electromagnetic Field, Faculty of Electrical Engineering, Czech Technical University in Prague, Czech Republic
graduated summa cum laude
- Sept. 2004 – **Bachelor of Science in Electronics and Telecommunication Engineering**.
June 2007
Dept. of Electromagnetic Field, Faculty of Electrical Engineering, Czech Technical University in Prague, Czech Republic

Career History

- Dec. 2023 – **Full professor**.
now
Czech Technical University in Prague, Czech Republic
- June 2017 – **Associate professor**, *Source Concept Based Analysis and Synthesis of Small Radiating Structures*.
Nov. 2023
Dept. of Electromagnetic Field, Faculty of Electrical Engineering, Czech Technical University in Prague, Czech Republic
- Nov. 2014 – **Assistant professor**.
May 2017
Dept. of Electromagnetic Field, Faculty of Electrical Engineering, Czech Technical University in Prague, Czech Republic

Training

- August 2022 COMSOL Multiphysics course
June 2017 Rhetoric course
June 2015 Advanced course on Adobe Illustrator
April 2012 Course of scientific computing on CUDA
June 2010 European School of Antennas (ESoA) – Antennas for Mobile Communication
March 2010 Course of HPC in Matlab

Scientific missions (three weeks and longer)

- Nov. 2021 **Lund University**, *Lund, Sweden*, prof. Gustafsson.
1-month stay on T-matrix extraction and decomposition of scattering dyadics into characteristic modes.
- Jan. 2020 – **Lund University**, *Lund, Sweden*, prof. Gustafsson.
Feb. 2020 1-month stay on topology optimization and cloaking.

- Aug. 2018 – **Lund University**, *Lund, Sweden*, prof. Gustafsson.
 May 2019 9-months stay on antenna synthesis techniques, 70% workload in Lund, the rest in Prague.
- Jan. 2018 – **Lund University**, *Lund, Sweden*, prof. Gustafsson.
 March 2018 3-months stay on multi-criteria convex optimization in antenna theory.
- Sept. 2016 – **Lund University**, *Lund, Sweden*, prof. Gustafsson.
 Feb. 2017 6-months stay on fundamental bounds in antenna theory and electromagnetism.
- Aug. – Sept. **KU Leuven**, *Leuven, Belgium*, prof. Vandenbosch.
 2015 1-month stay on new procedure to evaluate stored electromagnetic energy in time domain.
- Sept. 2013 **KU Leuven**, *Leuven, Belgium*, prof. Vandenbosch.
 1-month stay on energy stored in electromagnetic field.

Computer skills

- Advanced MATLAB, \LaTeX , Beamer, TikZ, FEKO
 Intermediate Mathematica, CST-MWS, Adobe Illustrator, Camtasia
 Basic COMSOL Multiphysics, AWR Microwave Office, Spice

Languages

- | | | |
|---------|-----------------------|---------------------------|
| Czech | Native Speaker | |
| English | C1 | <i>Proficient speaker</i> |
| Germany | A2 | <i>Basic user</i> |

Pedagogical experience

- 2025 **Instructor**, *Innovative Antenna Design: Insights Through Modal Decomposition*.
 Short course at EuCAP 2025, Stockholm (co-taught with Mats Gustafsson).
- 2024 **Organizer & Lecturer**, *European School of Antennas*.
 Optimal Antennas: Performance Limits and Inverse Design (2024, Prague).
- 2024 **Instructor**, *Optimal Antennas: Operators, Limits, and Design*.
 Short course at EuCAP 2024, Glasgow (co-taught with Mats Gustafsson).
- 2023 **Instructor**, *Matrix Formalism for Optimal Computational Design*.
 Short course at IEEE APS/URSI 2023, Portland (co-taught with Mats Gustafsson).
- 2022 – 2023 **Instructor**, *Optimal Inverse Design of Antennas*.
 Short courses at IEEE APS/URSI 2022, Denver and EuCAP 2023, Florence (co-taught with Mats Gustafsson).
- 2022 **PostDoc supervision**, *Enrique Moreno*.
- 2024 – now **Lecturer and guarantor**, *CTU in Prague*, Course on electromagnetic field theory (Code: BAB17EMP),
 The course is mandatory for all students of the Medical Electronics and Bioinformatics study branch.
- 2022 – now **Lecturer and guarantor**, *CTU in Prague*, Course on computational algebraic systems (Code: A8B17CAS),
 The course is mandatory for all students of the Open Electronic Systems study branch.
- 2013 – now **Lecturer and guarantor**, *CTU in Prague*, Elective course on MATLAB programming (Codes: B0B17MTB, BE0B17MTB).
 A course established from 2014 with \approx 70-80 students every year (taught both semesters in Czech and English).
- 2021, 2023 **Lecturer**, *European School of Antennas*.
 Characteristic modes: Theory and Applications (2021, Prague; 2023, Hannover).
- 2016 – now **Supervisor of Ph.D. students**, *CTU in Prague*, Five supervisions, two defended (2022, 2024).
- 2012 – now **Supervisor of Diploma Theses**, *CTU in Prague*, Five B.Sc. and ten M.Sc. theses supervised/co-supervised.
 All theses ranked Excellent (A). Students received three IEEE-MTT prizes for excellent Diploma Theses, five Dean's prizes for Excellent Diploma Theses, and the Poster Conference Award.
- 2010 – 2013 **Lecturer**, *CTU in Prague*.
 Six semesters of computational seminars in electromagnetic field theory and numerical methods at CTU-FEE.

2018 – now **Wiki & YT contributor**, *Science popularization*.

Creation and maintenance of the Wikipedia page on characteristic modes (link), extended YouTube talk (link).

Projects

Czech Science Foundation.

GA 24-11678S, GA 21-19025M (**PI**, 700k€+ budget), GA 19-06049S, GA 15-10280Y, GAP 102/12/2223, GD 102/08/H018

Technology Agency of the Czech Republic.

TH 04010373, TA 04010457 (**PI**, 600k€+ budget)

Ministry of Education Youth and Sports.

LTAİN 19047 (**PI**, 70k€+ budget), MSM 6840770014, OC 08018, LD 12055, FRVS G1/2470 (**PI**)

Czech Technical University in Prague.

SGS 10/170/OHK3/2T/13 (**PI**), SGS 11/065/OHK3/1T/13, SGS 12/142/OHK3/2T/13, RPAPS 2015 (**PI**), RPAPS 2020

European Cooperation in Science and Technology.

COST IC 0603 ASSIST, COST IC 1102 VISTA

Industry cooperation.

RF SPIN, Near-field scanning system (**PI**, 2022–2023),

Amazon US, AToM add-on evaluating fundamental bounds (**PI**, 2024, 44kUSD budget).

Industry training.

Leonardo UK, Course on Optimal Antenna Design (2024).

Invited talks and presentations

1. Capek, M.: "Upper Bound on Antenna Gain and Its Reachability," **Plenary talk**, *MRW 2024: 11th Microwave & Radar Week*, Wroclaw, Poland, July 2024.
2. Capek, M., Jelinek, L.: "Fundamental Bound on Maximum Antenna Gain as a Sum of Characteristic Modes," *The 17th European Conference on Antennas and Propagation*, Florence, Italy, March 2023.
3. Capek, M.: "Characteristic Modes for Antenna Analysis and Synthesis," **Plenary talk**, *The 15th European Conference on Antennas and Propagation*, Düsseldorf, Germany, March 2021.
4. Capek, M., Neuman, V., Tucek, J., Jelinek, L., Gustafsson, M.: "Topology Optimization of Electrically Small Antennas With Shape Regularity Constraints," *The 15th European Conference on Antennas and Propagation*, Düsseldorf, Germany, March 2021.
5. Capek, M., Jelinek, L., Masek, M.: "Fundamental Bounds for Multi-Port Antennas," *The 15th European Conference on Antennas and Propagation*, Düsseldorf, Germany, March 2021.
6. Capek, M., Jelinek, L., Gustafsson, M., Schab, K.: "Fundamental Bounds For Volumetric Structures and Their Feasibility," *The 14th European Conference on Antennas and Propagation*, Copenhagen, Denmark, April 2020.
7. Capek, M., Jelinek, L., Gustafsson, M., Losenicky, V.: "Fundamental Bounds on Dissipation Factor for Wearable and Implantable Antennas," *ICECOM 2019*, Dubrovnik, Croatia, 2019
8. Capek, M., Jelinek, L., Gustafsson, M., Losenicky, V.: "Topology Sensitivity in Method of Moments," *The 13th European Conference on Antennas and Propagation*, Krakow, Poland, April 2019.
9. Capek, M., Hazdra, P., Adler, V., Kadlec, V., Sedenka, V., Marek, M., Masek, M., Losenicky, V., Strambach, M., Mazanek, M., Rymus, J.: "AToM: A Versatile MATLAB Tool for Antenna Synthesis," *The 12th European Conference on Antennas and Propagation*, London, UK, April 2018.
10. Capek, M., Tayli, D., Akrou, L., Losenicky, V., Jelinek, L., Gustafsson, M.: "Accurate Evaluation of Characteristic Modes," *The 12th European Conference on Antennas and Propagation*, London, UK, April 2018.
11. Capek, M., Jelinek, L., Kadlec, P., Strambach, M.: "Excitation of Optimal and Suboptimal Currents," *The 11th European Conference on Antennas and Propagation*, Paris, France, 2017.
12. Capek, M., Masek, M., Hazdra, P.: "Some Numerical Aspects of Characteristic Mode Decomposition," *The 10th European Conference on Antennas and Propagation*, Davos, Switzerland, 2016.

13. Capek, M., Jelinek, L.: "On the Properties of Stored Electromagnetic Energy," *Progress in Electromagnetics Research Symposium*, Prague, Czech Republic, 2015.
14. Capek, M., Hazdra, P., Mazanek, M., Raida, Z., Rymus, J.: "The Antenna Toolbox for Matlab (AToM)," *The 9th European Conference on Antennas and Propagation*, Lisbon, Portugal, 2015.
15. Capek, M., Jelinek, L., Vandenbosch, G.A.E., Hazdra, P.: "A Novel Scheme for Stored Energy Evaluation," *The 9th European Conference on Antennas and Propagation*, Lisbon, Portugal, 2015.

Awards

- 2024 ESoA (European School of Antennas and Propagation) Best Teacher Award 2023
- 2023 2022 Edward E. Altschuler AP-S Magazine Prize Paper Award
- 2016 Dean's award for best teachers
- 2015 Josef Hlavka Award
- 2014 Werner von Siemens Excellence Award
- 2014 Dean's prize for excellent doctoral thesis
- 2014 COST VISTA best ER presentation
- 2013 Dean's award for best teachers
- 2009 IEEE-MTT/AP/ED/EMC prize for excellent diploma thesis
- 2009 Dean's prize for excellent diploma thesis
- 2025, 2021 Shortlisted for Best Paper (EM) at European Conference of Antennas and Propagation (EuCAP)

Overall scientific results

- Peer-reviewed journal papers (last 5 years): **33**
- Citations, WOS: **1136 (760)**
- Citations, Scopus: **1376 (869)**
- Citations, Google Scholar: **2202 (—)**
- Conference proceedings papers (last 5 years): **51**
- H-index, WOS: **20**
- H-index, Scopus: **22**
- H-index, Google Scholar: **30**

Other scientific merits

- 2009 – now Architect and leading developer of the AToM toolbox, see antennatoolbox.com.
- 2019 – now Associate Editor of IET Microwaves, Antennas & Propagation.
- 2025 – now Member of ESoA Board of Directors.
- 2015 – now Member of Technical Program Committee of student conference Poster.
- 2019 – 2025 Vice-chair of EurAPP Working group on Software and Modeling.
- 2023 – 2024 Guest editor of IEEE Open Journal of Antennas and Propagation, Special issue: *Modeling, analysis, and design methods for embedded antennas in IoT wireless devices*.
- 2018 – 2020 Vice-chair of IEEE MTT/AP/ED/EMC joint-chapter (IEEE Czechoslovakia Section).
- 2015 – 2020 Delegate of EurAAP Association (Group 8).
- 2015 – 2019 Associate Editor of Radioengineering.
- 2012, 2016 Member of the organizing committee/TPC of European Conference on Antennas and Propagation.
- 2016 Member of Super Technical Program Committee of IEEE AP-S/URSI.
- Affiliations Senior member of IEEE; member of IEEE-AP Soc., EurAPP
- Member of Special Interest Group on the Theory of Characteristic Modes (SIG).

- Referee work IEEE Trans. on Antennas and Propag.; IEEE Antennas and Wireless Propag. Letters; IEEE Antennas and Propag. Mag.; IEEE Trans. Wireless Com.; IEEE Access; IEEE Open Journal of Antennas and Propag.; IEEE Journal on Multiscale and Multiphysics Comp. Techniques; Radioengineering; IEEE Trans. on Microwave Theory and Techniques; IEEE Journal on Selected Areas in Information Theory; IET Microwaves, Antennas, and Propag.; IET Science, Measurement and Technology; IET Electronics Letters; IET Signal Processing; Progress in EM Research; FERMAT; Chinese Journal of Electronics, Radio Science; Wireless Communications and Mobile Computing; Scientific Reports; Communications Engineering. Reviewer of IEEE URSI/APS, EuCAP, iWAT, and MAREW conferences.
- Chairing Session organizer/chair/co-chair at PIERS2015, IEEE URSI/APS2017, EuCAP2017, EuCAP2018, EuCAP2019, EuCAP2020, EuCAP2021, EuCAP2022, EuCAP2023, IEEE URSI/APS2023, EuCAP2024, EuCAP2025.
- 2020 – now Member of Ph.D. Committees/Opponent (T. Michalek, CTU, 2020; N. Peitzmeier, Hannover Uni., 2021; M. Mirzaei, CTU, 2021; V. Grim, CTU, 2023; A. Tornese, CEA Leti; D. Hrakova, D. Novotny, CTU, 2024, J. Zechmeister, VUT in Brno, 2025).