

# Miloslav Čapek

*Curriculum Vitae* (June 17, 2022)

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*Associate 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

- June 2017 – **Associate professor**, *Source Concept Based Analysis and Synthesis of Small Radiating Structures*.  
now 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
- 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

## Training

- 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 (one month 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.
- Aug. – Sept. **KU Leuven**, *Leuven, Belgium*, prof. Vandenbosch.  
 2015 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

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

## Pedagogical experience

- 2022 **Instructor**, *Optimal Inverse Design of Antennas*.  
 Short course at IEEE APS/URSI 2022, Denver (co-taught with Mats Gustafsson).
- 2022 – now **Lecturer and guarantor**, *CTU in Prague*, Course on computational algebraic systems (Code: A8B17CAS).
- 2013 – now **Lecturer and guarantor**, *CTU in Prague*, Course on MATLAB programming (Codes: B0B17MTB, BE0B17MTB).  
 New course established from 2014+ with approx. 100 students every years (taught both semesters both in Czech and English).
- 2018 – now **Lecturer**, *European School of Antennas*.  
 Lecturer in course Characteristic modes: Theory and Applications.
- 2016 – now **Supervisor of Ph.D. students**, *CTU in Prague*, Five supervisions.
- 2012 – now **Supervisor of Diploma Theses**, *CTU in Prague*, Three B.Sc. and eight M.Sc. theses supervised.  
 Students received two IEEE-MTT prizes for excellent Diploma Thesis, four Dean's prizes for excellent diploma thesis, and Poster Conference Award.
- 2010 – 2013 **Lecturer**, *CTU in Prague*.  
 Six semesters of computational seminars in electromagnetic field theory and numerical methods at CTU-FEE.

## Projects

### Czech Science Foundation.

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

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## Invited talks and presentations

1. Capek, M.: "Characteristic Modes for Antenna Analysis and Synthesis," **Plenary talk**, *The 15th European Conference on Antennas and Propagation*, Düsseldorf, Germany, March 2021.
2. 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.
3. Capek, M., Jelinek, L., Masek, M.: "Fundamental Bounds for Multi-Port Antennas," *The 15th European Conference on Antennas and Propagation*, Düsseldorf, Germany, March 2021.
4. 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.
5. Capek, M., Jelinek, L., Gustafsson, M., Losenicky, V.: "Fundamental Bounds on Dissipation Factor for Wearable and Implantable Antennas," *ICECOM 2019*, Dubrovnik, Croatia, 2019
6. 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.
7. 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.
8. 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.
9. 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.
10. Capek, M., Masek, M., Hazdra, P.: "Some Numerical Aspects of Characteristic Mode Decomposition," *The 10th European Conference on Antennas and Propagation*, Davos, Switzerland, 2016.
11. Capek, M., Jelinek, L.: "On the Properties of Stored Electromagnetic Energy," *Progress in Electromagnetics Research Symposium*, Prague, Czech Republic, 2015.
12. 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.
13. 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.

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## Awards

- 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

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## Overall scientific results

- Peer-reviewed journal papers (last 5 years): **23**
- Citations, WOS: **510 (344)**
- Citations, Scopus: **688 (419)**
- Citations, Google Scholar: **1159 (-)**
- Conference proceedings papers (last 5 years): **40**
- H-index, WOS: **13**
- H-index, Scopus: **15**
- H-index, Google Scholar: **21**

## Other scientific merits

- 2009 – now Architect and main developer of AToM toolbox, see [antennatoolbox.com](http://antennatoolbox.com).
- 2015 – 2019 Associate Editor of Radioengineering.
- 2019 – 2022 Associate Editor of IET Microwaves, Antennas & Propagation.
  - 2020 Guest editor of IEEE Open Journal of Antennas and Propagation (Small and Multiband Antennas for Wireless Communications).
- 2015 – 2020 Delegate of EurAAP Association (Group 8).
- 2018 – 2020 Vice-chair of IEEE MTT/AP/ED/EMC joint-chapter (IEEE Czechoslovakia Section).
- 2019 – 2021 Vice-chair of EurAPP Working group on Software and Modeling.
  - 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.
- 2015 – now Member of Technical Program Committee of student conference Poster.
- Affiliations Senior member of IEEE; member of IEEE-AP Soc., EurAPP, COST IC, Radioengineering Soc.  
Member of Special Interest Group on the Theory of Characteristic Modes (SIG).
- Referee work IEEE Transactions on Antennas and Propagation; IEEE Antennas and Wireless Propagation Letters; IEEE Open Journal of Antennas and Propagation; Radioengineering; IEEE Transactions on Microwave Theory and Techniques; IET Microwaves, Antennas, and Propagation; IET Science, Measurement and Technology; IET Electronics Letters; IET Signal Processing; Progress in Electromagnetic Research; FERMAT; Radio Science; Wireless Communications and Mobile Computing; Scientific Reports. Reviewer of IEEE URSI/APS, EuCAP, and MAREW conferences.
- Chairing Session organizer/chair/co-chair at PIERS2015, APS2017, EuCAP2017, EuCAP2018, EuCAP2019, EuCAP2020, EuCAP2021, EuCAP2022.