Curriculum Vitae

Larisa Beilina, Ph.D. in Mathematics

• Personal data

- Name: Larisa Beilina
- Date of birth: 10.02.1970
- Career break: 1996-1997, 2005-2006 (Maternity leave)
- Working place: Department of Mathematical Sciences, Chalmers University of Technology and University of Gothenburg, Sweden
- Working address: Chalmers Tvärgata 3, 41258 Göteborg, Sweden
- e-mail: larisa@chalmers.se
- homepage: www.math.chalmers.se/∼larisa
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• Professional appointments

01.11.2023 - 01.12.2023	Guest Professor at the Department of Mathematics and Computer Science, Basel University, Switzerland.
15.11.2022 - 01.02.2023	Guest Professor at the Department of Mathematics and Computer Science, Basel University, Switzerland.
2018 - present	Full Professor in Applied Mathematics at the Department of Mathematical Sciences at Chalmers University of Technology and University of Gothenburg, Gothenburg, Sweden.
2012 - 2017	Associate Professor/Lecturer at the Department of Mathematical Sciences at Chalmers University of Technology and University of Gothenburg, Gothenburg, Sweden.
2009 -2011	Associate Lecturer at the Department of Mathematical Sciences at Chalmers University of Technology and University of Gothenburg, Gothenburg, Sweden.
2007-2008	PostDoc position at Norwegian University of Science and Technology, NTNU, Trondheim, Norway.
2003 - 2005	PostDoc position at Mathematical Department, Basel University, Switzerland.
2000 - 2003	PhD position at the Department of Mathematical Sciences, Chalmers University of Technology, Gothenburg, Sweden.
1998 - 1999	Research fellowship financed by Swedish Institute, Visby Program, at Chalmers University of Technology, Gothenburg, Sweden.
1995 - 1996	Engineer-programmer at Informational Center of Ministry of Internal Affairs, Riga, Latvia.

- **Exams**

Degree	Date	School
Docent in Applied Mathematics	2011	Chalmers University of Technology, Gothenburg
Ph.D. in Mathematics	2003	Chalmers University of Technology, Gothenburg
Ph.Lic. in Mathematics	2002	Chalmers University of Technology, Gothenburg
M.Sc. in Mathematics	1994	University of Latvia, Riga, Latvia
Engineer in Mathematics	1992	University of Latvia, Riga, Latvia

Experience from the supervision of students

- **Supervision of PhD students**

2011-2012	Co-adviser of PhD Nikolay Koshev who defended his PhD thesis entitled "Methods for spectra and images reconstruction in backscattered electrons regime of scanning electron microscopy" at 05.10.2012, Lomonosov Moscow State University, Russia.
2007-2012	Co-adviser of PhD Marte Hatlo-Andresen at NTNU, Trondheim, Norway. She has defended her PhD thesis entitled "Inverse scattering of two-dimensional photonic structures" at 29.03.2012 at the Department of Mathematics, NTNU, Trondheim.
2012 - 2017	Co-adviser of PhD student Christoffer Standar at the Department of Mathematics, Chalmers /GU (main adviser Professor M. Asadzadeh). C. Standar defended his PhD thesis entitled "On finite element schemes for Vlasov-Maxwell system and Schrödinger equation" at 15.12.2017.
2012-2017	PhD thesis adviser (main supervisor) of John Bondestam-Malmberg at the Department of Mathematics, Chalmers University of Technology and Gothenburg University (Chalmers /GU). He defended his PhD thesis entitled "Efficient adaptive algorithms for an electromagnetic coefficient inverse problem" at Chalmers/GU at 01.09.2017.
2022 - present	PhD thesis adviser (main supervisor) of Eric Lindström at the Department of Mathematics, Chalmers. University of Technology and Gothenburg University (Chalmers/GU).
2023 - present	PhD thesis co-adviser of Tarun Sharma (SC23D040) at the Department of Mathematics at Indian Institute of Space Science and Technology, Trivandrum, Kerala, India (main adviser Sakthivel K.).

- **Supervision of Master's students**

2002/2003	Master's thesis adviser of O. Simdyankina at NADA, KTH, Stockholm, Sweden. She defended Masters's thesis entitled "Adaptive FEM for an inverse scattering problem with Dirichlet boundary conditions" in 2003, KTH, Stockholm.
2014/2015	Master's thesis adviser of S. Hosseinzadegan. She defended Master's thesis entitled "Iteratively regularized adaptive finite element method for reconstruction of coefficients in Maxwell's system" in June 2015 at the Department of Mathematics at Chalmers, Gothenburg.
2015/2016	Master's thesis adviser of C. Persson. He defended Master's thesis entitled " Iteratively regularized finite element method for conductivity reconstruction in a waveguide" in May 2016 at the Department of Mathematics at Chalmers, Gothenburg.
2016/2017	Master's thesis adviser of M. Eriksson. He defended Master's thesis entitled "Parameter identification in a mathematical model of HIV infection with drug therapy" in September 2017 at the Department of Mathematics at Chalmers, Gothenburg.
2018/2019	Master's thesis adviser of Themis Mouliakos. He defended Master's thesis entitled "Bayesian Network Approach for Modelling and Inference of Communication Networks" in 2019 at the Department of Mathematics at Chalmers, Gothenburg.
2020/2021	Master's thesis adviser of Rebecca Gedda. She defended Master's thesis entitled "Interactive Change Point Detection Approaches in Time-Series" in 2021 at the Department of Mathematics at Chalmers, Gothenburg.
2021/2022	Master's thesis adviser of Joel Harf Abili and Marco Cuskic. They defended Master's thesis entitled "System Log File Anomaly Detection with Sparse Transformer Models" in 2022 at the Department of Mathematics at Chalmers, Gothenburg.
2022/2023	Master's thesis adviser of Adam Yacine Smaili. He defended Master's thesis entitled "Efficient C++/PETSc implementation of Helmholtz equation" in 2023 at the Department of Mathematics at Chalmers, Gothenburg.
2022/2023	Master's thesis adviser of Filip Dahlén. He defended Master's thesis entitled "Machine Learning Techniques for Metastatic Tumor Prediction" in 2023 at the Department of Mathematics at Chalmers, Gothenburg.

- **Supervision of Bachelor's students**

2015/2016	Adviser of Henrik Eklund, Jonas Jagers and Olle Wickius for bachelor thesis entitled "Investigation of the solution of linear least squares problems'.
2018/2019	Adviser of Ella Guiladi, Louise Leonard, Robin Nilsson, Noel Walters for bachelor thesis entitled "Mathematical model for optimal control of drugs in the mathematical model of dynamics of a tumor-immune system".
2018/2019	Adviser of Rebecca Gedda, Martin Gullbrandson, Aron Ivarsson, Wenjin Yuan for bachelor thesis entitled "Machine learning algorithms in classification problems".
2019/2020	Adviser of Marcus Sajland, Eric Johansson, Björn Krook Willén, Aladdin Hijazi for bachelor thesis entitled "A comparative study of regularized neural network with application for image classification"
2019/2020	Adviser of Tryggve Svensson, Emil Ekstrand, Marco Cuskic, Andreas Andersson for bachelor thesis entitled "Regularized and non-regularized machine learning and linear regression based algorithms in classification"
2022/2023	Adviser of Jonathan Bertolozzi, Regina Gustavsson, Karl Olsson-Lalor, Ellinor Sorpola Svenningsson for bachelor thesis entitled "Parameteridentifikation för matematisk modell beskrivande tumörcellers och makrofagers interaktioner ".
2022/2023	Adviser of Enya Arvidsson, Hannes Björck, Joel Carlsson, Albin Edegran, Bekir Fazlija for bachelor thesis entitled "Maskininlärningstekniker för bildigenkänning".

Teaching activities

All teaching activities together with links to the course pages are described at the link http://www.math.chalmers.se/∼larisa/teaching

Lecturer and examiner of the following courses at the Department of Mathematical Sciences, Chalmers/GU:

- HT2012 - present: Regular graduate course at Chalmers/GU "Numerical Linear Algebra" TMA265/MMA600, 7.5 Hp.
- VT2015 - present: Regular undergraduate course "Numerisk Analys" MMG410 at GU, 7.5 Hp.
- HT2022 - present: Regular (every second year) graduate Chalmers/GU course "Numerical methods and machine learning algorithms for solution of inverse problems", 7.5 Hp.
- HT2021: Graduate Chalmers/GU course "Introduction to inverse and ill-posed problems" at Chalmers/GU, 7.5 Hp.
- HT2011: Graduate course'Electromagnetic Fields and Waves: mathematical models and numerical methods", 7.5 Hp.

- HT 2015: Graduate course at the Department of Mathematical Sciences at Chalmers/GU “High performance scientific computing for PDE”, 7.5 Hp.
- VT 2016: Regular course at the graduate program at the Department of Mathematical Sciences at Chalmers/GU “Large and sparse matrix problems” TMA891/MMA610, 7.5 Hp.

Invited Lecturer and examiner of the courses:

- ”Numerical methods and machine learning algorithms for solution of inverse problems” at the 30 Jyväskylä Summer school, 9.08.2021 – 13.08.2021.
- ”Introduction to numerical solution of inverse problems”, planned to be given at the Summer School at the Department of Mathematics at Indian Institute of Space Science and Technology, Trivandrum, Kerala, India, 2024-2026.

Funding ID

- Sabbatical Grant from the Faculty of Science, GU, 2021, (664 000 SEK);
- Grant from special funds for Visiting Lecturers at University of Gothenburg in 2019/2020 (35 000 SEK).
- VR Project *“ Efficient algorithms for microwave imaging based on a new non-local optimization approach”*, PI, Project grant, the Swedish Research Council (VR), Sweden, 2019-2022 (3 375 000 SEK).
- Grant from donation funds at University of Gothenburg supporting teachers research and travel with scientific purpose, Gothenburg, Sweden, 2018 (1 000 EUR).
- Mobility grant supported by the Faculty of Sciences, University Paris-Sud, France, 2018 (1620 EUR).
- Grant from French Institute in Sweden, FRÖ program, 2018, France (750 EUR).
- *“Sabbatical Programme for researchers and teaching staff at the Faculty of Science, GU”*, grant for research collaboration with Aix-Marseille University and Institut Fresnel, France, 2015-2018 (400 000).
- Project *“Non-parametric optimization algorithms for nanophotonics simulations”*, Project grant from the Area of Advance of Nanoscience and Nanotehnology (AoA Nano) at Chalmers (together with P. Tassin, Department of Applied Physics at Chalmers University of Technology), 2015-2016 (450 000 SEK).
- VR Project *“Global convergence and adaptivity for coefficient inverse problems for Maxwell equations”*, PI, Project grant, the Swedish Research Council (VR), Sweden, 2012-2015 (2 950 000 SEK).

- *Project "Adaptive finite element methods for solutions of inverse problems"*, PI, Project grant, the Swedish Institute, Visby Program, 2010-2013 (1 188 800 SEK).

  Project cite:

  https://sites.google.com/site/visby2010/

Organization of conferences

1. Member of the organizing committee on the conference *"Mathematical and Numerical Approaches for Multi-Wave Inverse Problems"*, CIRM, Marseille, 1-5 April, 2019.

2. Organizer of the session *"Nonlinear and Inverse Problems in Electromagnetics"* on PIERS2017 (Progress In Electromagnetics Research Symposium, St.Petersburg, Russia, 22-25 May 2017).

3. Organizer of the minisymposium *"Recent progress in electromagnetic field theory and new trends in inverse problems"* on the International Conference of Numerical Analysis and Applied Mathematics (ICNAAM2016), Rhodes, Greece, 2016.

4. Member of the international organizing committee on the conferences: *"Inverse Problems: Modeling and Simulation"*, Antalya, Turkey, 2010, *"International workshop on Inverse and Ill-posed problems"*, Moscow State University, Russia, 2015; *Quantum Algebras, Quantum Integrable Models and Quantum Information (QQQ2016)*, the Sven Lovén Centre for Marine Sciences, Sweden, July 2016.

5. Organizer of the minisymposium *"Recent advances in numerical methods for inverse problems resolution"* on the International Conference of Numerical Analysis and Applied Mathematics (ICNAAM2010), Rhodes, Greece, 2010.

6. Organizer of three conferences within the Visby Project *"Adaptive finite element methods for solution of inverse problems"*, 2010-2013, *https://sites.google.com/site/visby2010/conferences*

Scientific activities, participation in research projects and international collaboration:

2003-2005 Project "New numerical methods for Maxwell's equations", The University of Basel, Switzerland, under the leadership of Prof. Marcus Grote. I worked on the hybrid interior penalty Discontinuous Galerkin FEM/FDM method for solution of Maxwell equations.

2003-2005 Project "Quantitative sonographic imaging of human hard tissue by mathematical modelling in scanning acoustic microscopy". This was a collaborative project with The Medical Center of The Frankfurt University (Prof. Dr. Robert Sader), The Institute for Applied Mathematics of the University of Basel (Prof. Marcus Grote), and The Institute of Experimental Surgery and Hospital Management, University Hospital Basel (Prof. Michael Heberer). I have applied the method which I have developed in my Ph.D. Thesis to reconstruct the elastic medium in scanning acoustic microscopy.

2007-2008 Project "Information and Communication Technologies" at Norwegian University of Science and Technology, NTNU, in collaboration with the project leader Prof. Harald Krogstad. I worked on the application of an adaptive FEM for an inverse electromagnetic scattering problem.

2007-2008 The NOTUR project of High Performance Computing (HPC) at Norwegian University of Science and Technology, NTNU. I have developed the C++ software in a parallel infrastructure for numerical solutions of some hyperbolic equations with variable coefficients as well as for corresponding MCIPs.

2007- 2011 Project "Globally convergent numerical methods for Multidimensional Coefficient Inverse Problems". This Project was supported by the Army Research Office (ARO) grant W911NF-08-1-0470. PI of the Project was Prof. Michael V. Klibanov, University of North Carolina at Charlotte, USA.

2010-2013 Project "Adaptive finite element methods for solutions of inverse problems" supported by the Swedish Institute, Visby Program. This is the collaborative project between Sweden and Russia. I'm PI of this project. Project includes development of new mathematical idea - adaptivity technique - to the solution of coefficient inverse problems in imaging using electromagnetic waves as well as in signal reconstruction in scanning electron tomography.

2011 - 2014 Project "Globally Convergent Numerical Methods for Inverse Problems of Imaging of Buried Targets". This is a collaborative project with the PI of the project Prof. Michael V. Klibanov, University of North Carolina at Charlotte, USA, and Prof. Michael Fiddy, Optical Center of the University of North Carolina at Charlotte, USA. This project is supported by the USA Army Research Laboratory grant W911NF-11-1-0399.

2012-2015 PI of the Project "Global convergence and adaptivity for coefficient inverse problems for Maxwell equations" supported by the Swedish Research Council (VR), Sweden.

2011-present I'm head of the scientific computing project WaveES, see project page http://waves24.com/.

2019- present PI of the Project "Efficient algorithms for microwave imaging based on a new non-local optimization approach" supported by the Swedish Research Council (VR), Sweden.

Academic/administrative activities

- Member of Editorial Board of International Journals: *Mathematics and Computers in Simulation* (MATCOM), Elsevier; *Journal of Computational Mathematics and Data Science*, Elsevier; and *Eurasian Journal of Mathematical and Computer Applications* (EJMCA).
- Reviewer of:
  - International Journals: *BIT*, *SIAM Sci.Comp*, *SIAM Num.Analysis (SINUM)*, *Communications in Mathematical Sciences (CMS)*, *Applicable Analysis*, *Inverse problems*, *Inverse Problems in Science and Engineering*, *Inverse and Ill-posed problems*, *International Journal of non-linear Mechanics, Elsevier*, *CAM, Elsevier*, *APNUM, Elsevier*, *TWMS Journal of Pure and Applied Mathematics*, in seven MDPI journals and five Elseviers journals.
  - the book *"Introduction to Iterative Methods for Ill-Posed Problems"* by Anatoly Bakushinsky, Mikhail Kokurin, Alexandra Smirnova, de Gruyter, 2010, and *"Handbook of Mathematical Methods in Imaging"*, Springer, 2010.
  - the book *"Numerical Methods for Partial Differential Equations: An Introduction"*, by Vitoriano Ruas, 2016, Wiley.
- Editor of the conference proceedings
  - 1) *Applied Inverse Problems*, Series: Springer Proceedings in Mathematics Statistics, Vol. 48, DOI 10.1007/978-1-4614-7816-4, 2013
  - 2) *Inverse Problems and Large-Scale Computations*, Series: Springer Proceedings in Mathematics Statistics, Vol. 52, Beilina, Larisa; Shestopalov, Yury V. (Eds.), DOI: 10.1007/978-3-319-00660-4, 2013
  - 3) *Inverse Problems and Applications*, Series: Springer Proceedings in Mathematics Statistics, Vol. 120, Beilina, Larisa (Ed.), ISBN 978-3-319-12499-5, 2015
  - 4) *Nonlinear and Inverse Problems in Electromagnetics* , Series: Springer Proceedings in Mathematics Statistics, Beilina, L., Smirnov Yu. G. (Ed.), ISBN 978-3-319-94060-1, 2018
  - 5) *Mathematical and Numerical Approaches for Multi-Wave Inverse Problems* , Series: Springer Proceedings in Mathematics Statistics, Beilina, L., Bergounioux, M., Cristofol, M., Da Silva, A., Litman, A. (Ed.), 2020.
  - 6) *Gas Dynamics with Applications in Industry and Life Sciences*, Series: Springer Proceedings in Mathematics Statistics, M. Asadzadeh, L. Beilina, S. Takata (Ed.), to appear in November 2023.
- Expert in the evaluation of Research Proposals in Foundation Flanders (FWO), Belgium, Panel "Mathematical Sciences", 2016.
- Examiner of Master's works for: Dan Dolonius, Ajeeb Ur Rehman, Mohammad Naseer, Samar Hosseinzadegan, Carl Persson, Themis Mouliakos, Rebecca Gedda, Martin Eriksson, Marcus Baaz, Marco Cuskic, Joel Harf Abili, Vincent Molin, Adam Smaili, Filip Dahlén, at the Department of Mathematical Sciences at Chalmers/GU, Gothenburg.

- Opponent (Diskussionsledare) for Filosofie licentiatseminarium of Elin Solberg, April 2015.
- Member of the examining committee (Ledamöt i betygsnämnd):
  - Siyang Wang, TDB, Uppsala University, Sweden, June 2017.
  - Pegah Takook, Department of Electrical Engineering, Chalmers University of Technology, March 2018.
  - Gustav Zickert, Department of Mathematics, KTH, Stockholm, September 2020.
  - Jonathan Andersson, Department of Mathematics, Linköping University, June 2022.
  - Pauline Achieng, Department of Mathematics, Linköping University, December 2023.
- Member of the Academic Appointments Board (LFN), NatFak, GU, November 2018 - June 2019
- Expert (sakkunig) in evaluation of :
  - Professorship in Applied Electromagnetics at Halmstadt University, 2019.
  - University Lecturer in Applied Mathematics at Halmstadt University, 2021.
  - Associate Lecturer in Mathematics, Örebro University, 2018.
  - 5 proposals for NSF VR (www.vr.se) for the call "International Postdoc (IPD) with a doctoral degree from a Swedish university", 2019.
  - PhD Yariv Aizenbud, University of Jyväskylä, Finland, 2019.
  - PhD Susanne Jauhiainen, University of Jyväskylä, Finland, 2022.
  - PhD Anjuna Dileep, Indian Institute of Space Science and Technology, Trivandrum, Kerala, India 2023.
- Member of the Mathematics review Panel and expert in the evaluation of Research Proposals in Mathematics in the Research Council of Finland: November 2022- January 2023, June 2023 (Flagship Programme call), February - March 2024.

Conference presentations (invited and plenary speaker)

1. Invited speaker at the 11 International Conference "Inverse Problems: Modeling and Simulation", Malta, 26.05 - 01.06, 2024. Title: "Adaptive finite element method for electromagnetic coefficient inverse problem in conductive media". https://www.ipms-conference.org/ipms2024/m10
2. Invited speaker at the Department of Mathematics at the Southern University of Science and Technology (SUSTech), China, 6 December 2023. Title: "Adaptive algorithms for electromagnetic coefficient inverse problem in conductive media".
3. Invited speaker on the seminar in Basel University (10 November 2023). Titel:" A posteriori error estimates and adaptive error control for electromagnetic coefficient inverse problem in conductive media". https://dmi.unibas.ch/de/event/details/seminar-in-numerical-analysis-larisa-beilina-university-of-goeteborg

4. Invited speaker at the Department of Mathematics at Indian Institute of Space Science and Technology, Trivandrum, Kerala, India. Presentation “A posteriori error estimates and adaptive error control for permittivity reconstruction in conductive media” (July 2023).

5. Invited speaker at the Tenth International Conference ”Inverse Problems: Modeling and Simulation”, Malta, May 22 - 28, 2022 https://www.ipms-conference.org/ipms2022/m29

6. Invited speaker at the JSP/SAC seminar ”On Gas Kinetics/Dynamics and Life Science”, 2022. Presentation “A domain decomposition finite element/finite difference method for permittivity reconstruction from time-dependent scattered data in conductive media”.

7. Invited speaker on the seminar in Basel University (3 December 2021). Title: “Adaptive algorithms for solution of an electromagnetic volume integral equation with application to microwave thermometry”.

8. Invited speaker at the web-seminar ”Control in Times of Crisis”,

   http://ctcseminar.mat.utfsm.cl/

9. Invited speaker on ESI Workshop on ”Tomographic Reconstructions and their Startling Applications”, https://www.esi.ac.at/events/e389

10. Invited speaker on the congress WCCM ECCOMAS 2020, Paris, July 2020, which was moved to January 2021, online.

11. Presentation at CAM seminar “An adaptive finite element method for solution of an ill-posed problem with application im microwave thermometry”.

12. Invited speaker on the conference *Mathematics of Complex Systems in Biology and Medicine*, CIRM, Marseille, France, 24-28 February 2020. Presentation entitled ”Time-adaptive determination of drug efficacy in the mathematical model of HIV infection”.

13. Presentation “Parameter identification in mathematical model of HIV infection with drug therapy”, Institut Mittag-Leffler, Stockholm, 26 October, 2018.

14. “Non-local imaging methods for solution of electromagnetic inverse problems”, invited presentation at UPMC, Paris, 2018.

15. Presentation “Computational design of acoustic materials using an adaptive optimization algorithm”, CAM seminar, Chalmers University of Technology, Sweden, 21 February 2018.

16. Presentation “Adaptive finite element method for identification of isotropic coefficients in Maxwell’s equations”, TDB, Uppsala University, 14 February 2018.

17. Presentation “High performance numerical methods for electromagnetic inverse problems ”, IR4M CNRS UMR8081 at Paris-Syd University, Orsay, 15 January 2018.

18. Presentation “New global optimization approach for the solution of hyperbolic coefficient inverse problem”, Institut Mittag-Leffler, Stockholm, 29 May, 2017.

19. Presentation “Adaptive optimization algorithm for the computational design of nanophotonic structures” at ICEAA 2016, Australia, 2016.

20. Presentation “Quantitative imaging technique using the layer-stripping algorithm” at ICNAAM2016, Greece, 2016.

21. Invited speaker at Aix-Marseille University, France, June 2016. Presentation entitled “Optimization approach in the computational design of nanophotonic structures”.

22. Invited speaker on the conference “Applications of mathematics” in honor of the 90-th birthday of Ivo Babuška, 18-21.11.2015, Prague, Czech Republic. Presentation entitled “Iteratively regularized adaptive finite element method in the reconstruction of coefficients in Maxwell equations”.

23. Invited speaker on the colloquium at FRUMAM, Aix-Marseille University - Site St Charles, France, June 2015. Presentation entitled “Quantitative imaging technique using an adaptive finite element method”.

24. Invited speaker at the Brown Bag Seminar, Department of Applied Mechanics, Chalmers University of Technology. Presentation entitled “Adaptive finite element method in shape reconstruction of objects from backscattered experimental data”, 20 February 2015.

25. Plenary speaker on the 6-th International Conference on Advanced COmputational Methods in ENgineering (ACOMEN2014), Ghent, Belgium, 23-28 June 2014.

26. Invited speaker at the Brown Bag Seminar, Department of Applied Mechanics, Chalmers University of Technology, Brown Bag Seminar, “Quantitative reconstruction methods from experimental data”, 5 June 2014.

27. Invited speaker on the conference *Recent progress for mathematical and numerical analysis of inverse problems* in CIRM, Marseille, France, 19-23 May 2014. Presentation entitled “Approximate globally convergent method and adaptive finite element methods in imaging of targets from experimental data”.

28. Third annual workshop on Inverse Problems within the Visby Program, Stockholm, 2-6 May 2013. Presentation entitled ”Experimental verification of an approximately globally convergent method in pico-second scale regime.”

29. Invited speaker on the conference ”Inverse Problems and Nonlinear Equations” at CMAP, Ecole Polytechnique (Palaiseau), France, 22-24 May, 2013. Presentation entitled “Quantitative imaging technique using an approximately globally convergent method”.

30. Colloquium talk at Georgia Institute of Technology, January 2013, Atlanta, Georgia, USA (contributed).

31. Faculty of Technology and Science, Department of Mathematics, Karlstadt University, 5.11.2012. Presentation entitled “Approximate Global Convergence and Adaptivity in imaging of land mines”.

32. Second annual workshop on Inverse Problems within the Visby Program, Sunne, 2-6 May 2012. Presentation entitled “Approximate global convergence in imaging of land mines from backscattered data”.

33. Department of Mathematics, KTH, Stockholm, seminar "Spectral Theory" at 24.11.2011. Presentation entitled "Approximate global convergence and adaptive finite element method for coefficient inverse problems with experimental data".

34. 2011-09-27 - 2011-09-29 Conference "Inverse Problems and Applications" at CMAP, Ecole Polytechnique (Palaiseau), France. Presentation entitled "Approximate globally convergent numerical method and adaptivity technique for inverse problems with experimental data".

35. First annual workshop on Inverse Problems within the Visby Program, Department of Mathematical Sciences, Chalmers University of Technology and Gothenburg University, 2-3 June 2011. Presentation entitled "Adaptive Finite Element Method for a Coefficient Inverse Problem for the Maxwell's system".

36. Mini-workshop on Inverse Problems at Moscow State University, Moscow, Russia, 27.04.2011. Presentation entitled "Approximate global convergence and adaptivity for solutions of inverse problems".

37. Presentation at University Paris 6 at d'Alembert general seminar in Paris, France, on 10 February 2011.

38. Presentation at Mathematical Department in Basel University, November 2010.

39. Presentation at CAM seminar, Chalmers University of Technology, Sweden, November 2010.

40. Presentation at AGMP2010, *T järnö*, Sweden, November 2010.

41. 8th International Conference of Numerical Analysis and Applied Mathematics ICNAAM2010, Rhodes, Greece, 2010.

42. Conference "Inverse Problems", organized by University Cergy-Pontoise, France, October 2009.

43. Conference "Control and Inverse Problems in PDE : Theoretical and numerical aspects", Organized by The International Center for Mathematical Meetings, Marseille, France, February 2009.

44. Special Semester on Computational Methods for Inverse Problems - Theory and Practice, Johan Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria, April 2009.

45. Conference on Applied Inverse Problems, University of Vienna, organized by Johan Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria, July 2009. Invited speaker at the minisymposium "Carleman estimates: theory and numerical methods for inverse problems".

46. Special Semester on Quantitative Biology Analyzed by Mathematical Methods, at Johan Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria, 2008.

47. Special Semester on Quantitative Biology Analyzed by Mathematical Methods, at Johan Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria, 2007. Title: "Adaptive finite element method in reconstruction of an symmetric structure".

48. European Community on Computational Methods in Applied Sciences (ECCOMAS): thematic conference COMPDYN 2007 "Computational methods in Structural Dynamic and Earthquake Engineering", 13-16 June 2007, Rethymno, Crete, Greece. I was invited on the minisimposium "Computational Methods for Inverse Scattering".

49. IEEE ISBI2007 (International Symposium on Biomedical Imaging), April 12-15, 2007, Metro Washington, D.C.,USA. I was invited on the special session "Adaptive mesh refinment techniques in biomedical imaging".

50. MAGIC (Manifolds and Geometric Integration Colloquia), Atnasjøen, Norway, 2007.

51. The Second International Conference on Inverse Problems, Turkey, Fethiye, 2004.

52. The First International Conference on Inverse Problems, Fethiye, Turkey, 2002.

53. Workshop on Optimization in Heidelberg, University of Heidelberg, Germany, 2002.

54. International Conference on Finite Element Methods: three dimensional problems, University of Jyväskylä, Finland, 2001.

55. ENUMATH 2001 (European Conference on Numerical Mathematics and Advanced Applications), Ischia, Italy, 2001.

56. Nordic computational differential equations circus, Tampere University, Finland, 2001.

57. The Finite Element Center day at Chalmers, Chalmers University, Göteborg, Sweden, 2001.

58. Nordic computational differential equations circus, Bergen University, Bergen, Norway, 2000.

Awards

- Invited visiting researcher at the Institutt Mittag-Leffler's Program "Mathematical Biology", 25 October- 2 November 2018.
- Laureate of the guest program 2018 for the collaborative work at the University Paris-Sud supported by the Faculty of Sciences, University Paris-Sud, France.
- Laureate in the mobility program FRÖ 2018 supported by the French Institute in Sweden for the collaborative work with University Paris 6, UPMC, and University Paris-Sud.
- Recognized reviewer of Elsevier Journals "Applied Numerical Mathematics"', "Computers and Mathematics with Applications" in 2015.
- Appointment at Institute Mittag-Leffler in the Spring semester 2013 (January 14 - May 15) "Inverse Problems and Applications".
- The best publication Award of The Institute of Mathematics of the Academy of Sciences of the Czech Republic, 2005

- The Visby Program Award from the Swedish Institute. Individual Scholarship at the Department of Mathematics, Chalmers University of Technology, supported by the Swedish Institute, 1998-1999.

- DAAD (German Academic Exchange Service) award, Rostock University, Germany, 1993.

Open Source computer programs

- Software package **WavES** for the numerical solution of different types of time-dependent wave equations (acoustic, elastic and electromagnetic).

  Project link: *http://waves24.com/*

- Github library of Matlab and PETSc programs for algorithms in the book

  L. Beilina, E. Karchevskii, M. Karchevskii, *Numerical Linear Algebra: theory and applications*, Springer, 2017.

  $https://github.com/springer-math/Numerical\_Linear\_Algebra\_Theory\_and\_Applications$

- Solution of volume integral equation (VIE) in 3D used in the paper

  L. Beilina, M. G. Aram, E. Karchevskii, An adaptive finite element method for solving 3D electromagnetic volume integral equation with applications in microwave thermometry, *Journal of Computational Physics, 2022*. https://doi.org/10.1016/j.jcp.2022.111122

  1. Matlab's solver:
     https://github.com/larisa70/MicrowaveHyperthermia_Matlab2020
  2. Solution of 3D VIE (C++/PETSc solver):
     https://github.com/ProjectWaves24/MicrowaveHypAFEM2
  3. FE/FD mesh generation code in 3D (C++/PETSc solver):
     https://github.com/ProjectWaves24/MESH

- Matlab's code used in the paper L. Beilina, M. Eriksson, I. Gainova, Time-Adaptive Determination of Drug Efficacy in Mathematical Model of HIV Infection, *Differential Equations and Dynamical Systems* https://doi.org/10.1007/s12591-021-00572-w

  https://github.com/larisa70/AFEM_HIV

- C++/PETSc code for solution of Helmholtz equation in 2D using FDM.

  https://github.com/larisa70/PETSc_FDM

  https://waves24.com/download/

Popular science articles/presentations

- I. Gainova, **L. Beilina**, J. Argilaguet, A. Meyerhans, G. Bocharov, *"Mathematical modelling of HIV infection: a system approach"*, El Pais,

  https://elpais.com/elpais/2018/11/29/ciencia/1543520090_602839.html

- **L. Beilina**, Solving the unsolvable, International Innovation, March 2013, (Research Media, UK, pp.112-114) ISSN 2041-4552.

Patents

- "Determining an Internal structure of an object", Inventor: **L. Beilina**, US Provisional patent application, application nr. 62/770,235

- *System and Method for Multiphase Flow Measurements*,
  Patent No.:108. (WO2015121365)
  International Application No.: PCT/EP2015/053002.
  Inventors: Eriksson, Anders; (SE)
  Beilina, Larisa; (SE).

Innovative research

- Participation in TechMatching program, Chalmers Ventures. Presentation for Encubation program at TechMatching/Chalmers Ventures "Detection of structure of objects using microwaves", 2 May 2019.

- VFT grant from GU Ventures for identification of business modell around technology "Detection of structure of objects using microwaves", 2019.

- Ongoing work on VFT grant with GU Ventures on verification of technology for the project "System and method for skin cancer detection using RF/microwaves".

Publications

Research track-record

In 2000-2003 I have developed domain decomposition adaptive finite element/finite difference method for solution of Coefficient Inverse Problems (CIPs) for time-dependent acoustic and elastic wave equations. This method has formed the basis of my Ph.D. thesis (adviser: Prof. Claes Johnson). Later I have elaborated a stabilized adaptive finite element method for the solution of CIPs for time-dependent Maxwell equations. In 2007-2012 I have developed a radically new approximate globally convergent numerical method for the solution of CIPs with combination of an adaptive finite element method. The paper *L. Beilina, M.V. Klibanov, Reconstruction of dielectrics from experimental data via a hybrid globally convergent/adaptive inverse algorithm,* Inverse Problems *26 (12), 125009, 2010* became a featured article in J.Inverse Problems in 2010. The work on a new approximate globally convergent method in combination with an adaptive finite element method is summarized in the book *Approximate global convergence and adaptivity for coefficient inverse problems*, Springer, New York, 2012. A textbook *Numerical Linear Algebra: Theory and Applications* is published in Springer in 2017 and is used as a teaching material in the regular postgraduate course *Numerical Linear Algebra* which I teach at Chalmers/GU. I also have developed C++/PETSc scientific computing library WavES (waves24.com) for the fast solution of time-dependent wave equations (acoustic, Maxwell's and elastic) in 2D and 3D, and is co-author of the Patent No.:108 (WO2015121365), International Application No.: PCT/EP2015/053002.

I have participated in 9 international research projects, presented scientific work as invited or plenary speaker at more than 50 international conferences, workshops and seminars, organized 8 international minisymposiums and workshops. I'm member of editorial board of 3 international mathematical journals and reviewer for more than 20 international mathematical journals. I'm expert in the evaluation of research proposals in Foundation Flanders, Belgium, Panel "Mathematical Sciences", and Project Grants and Research Fellowships in the Research Council of Finland.

I have published more than 90 papers in peer-reviewed journals and peer-reviewed conference proceedings which are cited in SCOPUS, 2 monographs, as well as edited 6 conference proceedings in the Series: Springer Proceedings in Mathematics Statistics. According to Google Scholar on 04.10.2023 I have a total 2251 citations an my h-index is 26. All further information about my research, projects, publications and teaching activities can be found at http://www.math.chalmers.se/$\sim$ larisa/. Link to the page in Google Scholar: https://scholar.google.com/citations?user=2cwCXPgAAAAJhl=en

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1. **L. Beilina**, M. G. Aram, E. Karchevskii, An adaptive finite element method for solving 3D electromagnetic volume integral equation with applications in microwave thermometry, *Journal of Computational Physics, 2022*. https://doi.org/10.1016/j.jcp.2022.111122

2. **L. Beilina**, E. Lindström, An adaptive finite element/finite difference domain decomposition method for applications in microwave imaging, *Electronics, MDPI*, 2022, 11(9), 1359; https://doi.org/10.3390/electronics11091359

3. **L. Beilina**, M. Cristofol, S. Li, M. Yamamoto, Lipschitz stability for an inverse hyperbolic problem of determining two coefficients by a finite number of observations, *Inverse Problems*, 34,

015001, 2018.

4. **L. Beilina**, M.V. Klibanov, A globally convergent numerical method for a coefficient inverse problem *SIAM Journal on Scientific Computing* 31 (1), 478-509, 2008.

5. **L. Beilina**, C. Johnson, A posteriori error estimation in computational inverse scattering, *Mathematical models and methods in applied sciences*, 15 (01), 23-35, 2005.

6. **L. Beilina**, M. V. Klibanov, M. Y. Kokurin, Adaptivity with relaxation for ill-posed problems and global convergence for a coefficient inverse problem, *Journal of Mathematical Sciences*, 167 (3), 279-325, 2010.

7. **L. Beilina**, Nguyen Trung Thành, M. V. Klibanov and J. B. Malmberg, Reconstruction of shapes and refractive indices from backscattering experimental data using the adaptivity, *Inverse Problems*, 30, 105007, 2014.

8. **L. Beilina**, C. Clason, An adaptive hybrid fem/fdm method for an inverse scattering problem in scanning acoustic microscopy, *SIAM Journal on Scientific Computing*, 28 (1), 382, 2007.

9. **L. Beilina**, Energy estimates and numerical verification of the stabilized Domain Decomposition Finite Element/Finite Difference approach for time-dependent Maxwell's system, *Central European Journal of Mathematics*, 11 (4), 702-733, 2013.

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1. **L. Beilina**, E. Karchevskii, M. Karchevskii, *Numerical Linear Algebra: theory and applications*, Springer, 2017.

2. **L. Beilina**, M.V. Klibanov, *Approximate global convergence and adaptivity for coefficient inverse problems*, Springer, New-York, 2012.

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2. **L. Beilina**, M. Bergounioux, M. Cristofol, A. Da Silva, A. Litman (Eds.), *Mathematical and Numerical Approaches for Multi-Wave Inverse Problems*, Springer, PROMS 328, 2020.

3. **L. Beilina**, Smirnov Yu. G. (Eds.), *Nonlinear and Inverse Problems in Electromagnetics*, Series: Springer Proceedings in Mathematics Statistics, ISBN 978-3-319-94060-1, 2018

4. **L. Beilina** (Eds.), *Applied Inverse Problems*, Series: Springer Proceedings in Mathematics Statistics, Vol. 48, DOI 10.1007/978-1-4614-7816-4, 2013.

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