Curriculum Vitae Larisa Beilina, Ph.D. in Mathematics Professor of Applied Mathematics Department of Mathematical Sciences Chalmers University of Technology and University of Gothenburg, Sweden e-mail: larisa@chalmers.se homepage: www.math.chalmers.se/~larisa

Academy degree

Professor	2018
Associate Professor	2012
Docent	2011
Ph.D. in Mathematics	2003
Ph.Lic. in Mathematics	2002
M.Sc. in Mathematics	1994
Engineer Diploma in Mathematics	1992

University of Gothenburg, Sweden University of Gothenburg, Sweden University of Gothenburg, Sweden Chalmers University of Technology, Sweden University of Latvia, Riga, Latvia University of Latvia, Riga, Latvia

Professional appointments

2018 - present	Professor of Applied Mathematics at the Department of Mathemati-
	cal Sciences, Chalmers University of Technology and University of
	Gothenburg, Gothenburg, Sweden.
2012 - 2017	Associate Professor, Senior Lecturer at the Department of Mathe-
	matical Sciences, Chalmers University of Technology and Univer-
	sity of Gothenburg, Gothenburg, Sweden.
2009 -2011	Associate Lecturer at the Department of Mathematical Sciences,
	Chalmers University of Technology and University of Gothenburg,
	Gothenburg, Sweden.
2007-2008	PostDoc position at Norwegian University of Science and Technol-
	ogy, NTNU, Trondheim, Norway.
2003 - 2005	PostDoc position at Mathematical Department, Basel University,
	Switzerland.
2000 - 2003	PhD student at Chalmers University of Technology, Gothenburg,
	Sweden.
1998 - 1999	Research fellowship (Visby program) at Chalmers University of
	Technology, Gothenburg, Sweden.
1995 - 1996	Engineer-programmer (first lieutenant) at Informational Center of
	Ministry of Internal Affairs, Riga, Latvia.

Career break

• 1996-1997, 2005-2006 Maternity leave

Experience from the supervision of students

PhD students

- 2011-2012 Co-adviser of PhD Nikolay Koshev who defended 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 twodimensional 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.

Master and bachelor 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.

- 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"

Teaching activities

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

• Fall semester 2011, Graduate course at the Department of Mathematical Sciences "Electromagnetic Fields and Waves: mathematical models and numerical methods", 7.5 Hp (together with prof.Y.Shestopalov).

Course link:

https://sites.google.com/site/visby2010/course-at-department-of-mathematical-sciences-chalmers-university-of-technolog-and-gotheburg-university-sweden

- Fall semester 2009, Graduate course at the Department of Mathematical Sciences at Chalmers/GU "Numerical methods for solutions of Coefficient Inverse Problems", 7.5 Hp.
- Spring semester 2009, regular course at the Department of Mathematical Sciences at Chalmers/GU MVE255 "Matematisk Analys i Flera Variabler", M(TD).
- HT2012 present, regular course at the graduate program at the Department of Mathematical Sciences at Chalmers/GU "Numerical Linear Algebra" TMA265/MMA600, 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.
- VT 2016 present, regular course at the Department of Mathematical Sciences at Chalmers/GU "Numerisk Analys" MMG410, 7.5 Hp.
- HT 2019 present, course at the graduate program at the Department of Mathematical Sciences at Chalmers/GU "Introduction to inverse and ill-posed problems". 7.5 Hp.

Funding ID

- Grant from special funds for Visiting Lecturers at University of Gothenburg in 2019/2020 (35 000 SEK \approx 3000 EUR).
- "*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 \approx 293 000 EUR).
- 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 SEK \approx 35 000 EUR).
- "*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).
- "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 \approx 328 000 EUR).
- *Project "Adaptive finite element methods for solutions of inverse problems"*, PI, Project grant, the Swedish Institute, Visby Program, 2010-2013 (1 188 800 SEK \approx 132 000 EUR).

Project cite:

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

Organization of conferences

- Member of the organizing committee on the conference "Mathematical and Numerical Approaches for Multi-Wave Inverse Problems", CIRM, Marseille, 1-5 April, 2019.
- Organizer of the session "Nonlinear and Inverse Problems in Electromagnetics" on PIERS2017 (Progress In Electromagnetics Research Symposium, St.Petersburg, Russia, 22-25 May 2017).
- 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.

- 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 Lovn Centre for Marine Sciences, Sweden, July 2016.
- 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.
- 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 Char-
	lotte, 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 in-
	verse 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/.
2019-2022	PI of the Project "Efficient algorithms for microwave imaging based on a
	new non-local optimization approach" supported by the Swedish Research

Academic activities

- Member of Editorial Board of *Mathematics and Computers in Simulation* (MATCOM), Elsevier, and *Eurasian Journal of Mathematical and Computer Applications* (EJMCA).
- Reviewer in J. Communications in Mathematical Sciences (CMS), Inverse problems, Inverse Problems in Science and Engineering, Inverse and Ill-posed problems, SIAM SciComp, International Journal of non-linear Mechanics, Elsevier, CAM, Elsevier, APNUM, Elsevier, TWMS Journal of Pure and Applied Mathematics. Reviewer of 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.
- Editor of the conference proceedings

Council (VR), Sweden.

- 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
- A) 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.
- Expert in the evaluation of Research Proposals in Foundation Flanders (FWO), Belgium, Panel "Mathematical Sciences".

- Examiner of diverse Master's works in the period 2009-2020 of Dan Dolonius, Ajeeb Ur Rehman, Mohammad Naseer, Samar Hosseinzadegan, Carl Persson, Themis Mouliakos at the Department of Mathematical Sciences at Chalmers, Gothenburg.
- Opponent (Diskussionsledare) for Filosofie licentiatseminarium of Elin Solberg, April 2015.
- Member of the examining committee (Ledamöt i betygsnämnd): for Filosofie doktorsexamen of Siyang Wang, June 2017, TDB, Uppsala University, Sweden.
- Member of the examining committee (Ledamöt i betygsnämnd) for Filosofie doktorsexamen of Pegah Takook, Department of Electrical Engineering, Chalmers University of Technology, March 2018.

Conference presentations (invited and plenary speaker)

- 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".
- Presentation "Parameter identification in mathematical model of HIV infection with drug therapy", Institut Mittag-Leffler, Stockholm, 26 October, 2018.
- "Non-local imaging methods for solution of electromagnetic inverse problems", invited presentation at UPMC, Paris, 2018.
- Presentation "Computational design of acoustic materials using an adaptive optimization algorithm", CAM seminar, Chalmers University of Technology, Sweden, 21 February 2018.
- Presentation "Adaptive finite element method for identification of isotropic coefficients in Maxwell's equations", TDB, Uppsala University, 14 February 2018.
- Presentation "High performance numerical methods for electromagnetic inverse problems ", IR4M CNRS UMR8081 at Paris-Syd University, Orsay, 15 January 2018.
- Presentation "New global optimization approach for the solution of hyperbolic coefficient inverse problem", Institut Mittag-Leffler, Stockholm, 29 May, 2017.
- Presentation "Adaptive optimization algorithm for the computational design of nanophotonic structures" at ICEAA 2016, Australia, 2016.
- Presentation "Quantitative imaging technique using the layer-stripping algorithm" at ICNAAM2016, Greece, 2016.
- Invited speaker at Aix-Marseille University, France, June 2016. Presentation entitled "Optimization approach in the computational design of nanophotonic structures".

- 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".
- 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".
- 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.
- Plenary speaker on the 6-th International Conference on Advanced COmputational Methods in ENgineering (ACOMEN2014), Ghent, Belgium, 23-28 June 2014.
- 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.
- 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".
- 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."
- 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".
- Colloquium talk at Georgia Institute of Technology, January 2013, Atlanta, Georgia, USA (contributed).
- 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".
- 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".
- 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".
- 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".

- 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".
- 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".
- Presentation at University Paris 6 at d'Alembert general seminar in Paris, France, on 10 February 2011.
- Presentation at Mathematical Department in Basel University, November 2010.
- Presentation at CAM seminar, Chalmers University of Technology, Sweden, November 2010.
- Presentation at AGMP2010, *T järnö*, Sweden, November 2010.
- 8th International Conference of Numerical Analysis and Applied Mathematics ICNAAM2010, Rhodes, Greece, 2010.
- Conference "Inverse Problems", organized by University Cergy-Pontoise, France, October 2009.
- Conference "Control and Inverse Problems in PDE : Theoretical and numerical aspects", Organized by The International Center for Mathematical Meetings, Marseille, France, February 2009.
- Special Semester on Computational Methods for Inverse Problems Theory and Practice, Johan Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria, April 2009.
- 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".
- Special Semester on Quantitative Biology Analyzed by Mathematical Methods, at Johan Radon Institute for Computational and Applied Mathematics (RICAM), Linz, Austria, 2008.
- 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".
- 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".
- 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".

- MAGIC (Manifolds and Geometric Integration Colloquia), Atnasjøen, Norway, 2007.
- The Second International Conference on Inverse Problems, Turkey, Fethiye, 2004.
- The First International Conference on Inverse Problems, Fethiye, Turkey, 2002.
- Workshop on Optimization in Heidelberg, University of Heidelberg, Germany, 2002.
- International Conference on Finite Element Methods: three dimensional problems, University of Jyväskylä, Finland, 2001.
- ENUMATH 2001 (European Conference on Numerical Mathematics and Advanced Applications), Ischia, Italy, 2001.
- Nordic computational differential equations circus, Tampere University, Finland, 2001.
- The Finite Element Center day at Chalmers, Chalmers University, Göteborg, Sweden, 2001.
- Nordic computational differential equations circus, Bergen University, Bergen, Norway, 2000.

Awards

- Grant from special funds for Visiting Lecturers at University of Gothenburg in 2019/2020.
- "*Efficient algorithms for microwave imaging based on a new non-local optimization approach*", Project grant, the Swedish Research Council (VR), Sweden, 2019-2022.
- Invited visiting researcher at the Institutt Mittag-Leffler, Program "Mathematical Biology", 25 October- 2 November 2018.
- Grant from donations funds at University of Gothenburg supporting teachers research and travel with scientific purpose, Gothenburg, Sweden, 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.
- Grant from the Faculty of Science, GU, for the Sabbatical at Aix-Marseille University and Institut Fresnel, France, 2015.
- Recognized reviewer of Elsevier Journals "Applied Numerical Mathematics", "Computers and Mathematics with Applications" in 2015.
- Award from the Area of Advance of Nanoscience and Nanotehnology (AoA Nano) at Chalmers (together with P. Tassin) for the project "*Non-parametric optimization algorithms for nanopho-tonics simulations*", 2015.
- Appointment at Institute Mittag-Leffler in the Spring semester 2013 (January 14 May 15) "Inverse Problems and Applications".

- Grant "Global convergence and adaptivity for coefficient inverse problems for Maxwell equations" supported by the Swedish Research Council (VR), Sweden, 2011-2015.
- The Visby Program Award from the Swedish Institute in 2010-2013.
- 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-access 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 "*Numerical Linear Algebra: theory and applications*", Springer, 2017.

https://github.com/springer-math/Numerical Linear_Algebra_Theory_and Applications

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).

Summary of publications

In 2000-2003 I have developed an adaptive finite element/finite difference method for solution of multidimensional coefficient inverse problems (MCIPs) for time-dependent acoustic and elastic wave equations. This method has formed the basis of my Ph.D. thesis. In 2005-2007 I have elaborated an adaptive finite element method for the solution of MCIPs for time-dependent Maxwell equations using a stabilized Domain Decomposition Finite Element/Finite Difference method. In 2007-2012 I have developed a new approximate globally convergent numerical method for the solution of MCIPs with combination of an adaptive finite element method. 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 new approximate globally convergent method in combination with an adaptive finite element method is summarized in the recent book [BOOKS, [3]]. Proof and numerical investigation of Lipschitz stability for an inverse hyperbolic problem of determining two coefficients and determining the conductivity for a nonautonomous hyperbolic operator in a cylindrical domain are recent research results, see papers [1,2] in the list of selected papers.

I have published more than 70 papers in peer-reviewed journals and peer-reviewed conference proceedings, as well as 2 monographs "*Approximate global convergence and adaptivity for coefficient inverse problems*", Springer, New York, 2012, and "*Numerical Linear Algebra: theory and applications*", Springer, 2017, and edited 4 conference proceedings [BOOKS, [1, 4, 5, 6]]. According to Google Scholar I have a total 1735 citations an my h-index is 24.

Selected 10 papers in peer-reviewed journals

- 1. L. Beilina, M. Cristofol, S. Li, Determining the conductivity for a nonautonomous hyperbolic operator in a cylindrical domain, *Math. Meth. Appl. Sci.*, 2018;119, DOI: 10.1002/mma.4728
- 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.
- 3. 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.
- 4. L. Beilina, C. Johnson, A posteriori error estimation in computational inverse scattering, *Mathematical models and methods in applied sciences*, 15 (01), 23-35, 2005.
- 5. 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.
- 6. 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.
- 7. 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.

- 8. L. Beilina, Energy estimates and numerical verification of the stabilized Domain Decomposition Finite Element/Finite Difference approach for time-dependent Maxwells system, *Central European Journal of Mathematics*, 11 (4), 702-733, 2013.
- 9. L. Beilina, Domain decomposition finite element/finite difference method for the conductivity reconstruction in a hyperbolic equation, *Communications in Nonlinear Science and Numerical Simulation*, 37, 2016, 222-237.
- 10. N. Koshev and L. Beilina, An Adaptive Finite Element Method for Fredholm Integral Equations of the first kind and its verification on experimental data, *CEJM*, 11(8), 1489-1509, 2013.

Books

- 1. 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.
- 2. L. Beilina, Smirnov Yu. G. (Ed.), *Nonlinear and Inverse Problems in Electromagnetics*, Series: Springer Proceedings in Mathematics Statistics, ISBN 978-3-319-94060-1, 2018
- 3. L. Beilina, E. Karchevskii, M. Karchevskii, *Numerical Linear Algebra: theory and applications*, Springer, 2017.
- 4. L. Beilina, M.V. Klibanov, *Approximate global convergence and adaptivity for coefficient inverse problems*, Springer, New-York, 2012.
- 5. L. Beilina (Ed.), *Applied Inverse Problems*, Series: Springer Proceedings in Mathematics Statistics, Vol. 48, DOI 10.1007/978-1-4614-7816-4, 2013.
- L. Beilina, Shestopalov, Yury V. (Eds.), *Inverse Problems and Large-Scale Computations*, Series: Springer Proceedings in Mathematics Statistics, Vol. 52, DOI: 10.1007/978-3-319-00660-4, 2013.
- 7. L. Beilina (Ed.), *Inverse Problems and Applications*, Series: Springer Proceedings in Mathematics Statistics, Vol. 120, ISBN 978-3-319-12498-8, 2015.

Peer-reviewed articles

- 1. L. Beilina, Adaptive hybrid FEM/FDM methods for inverse scattering problems. *Inverse Problems and Information Technologies*, V.1, N.3, pp.73-116, 2002.
- 2. L. Beilina, Adaptive hybrid finite element/difference methods: application to inverse elastic scattering. *Inverse and Ill-Posed Problems*, V.11, N.6, pp.585-618, 2003.
- 3. L. Beilina, Efficiency of a Hybrid FEM/FDM methods for elastic waves, *Applied and Computational Mathematics*, V.2, N.1, pp.13-29, 2003.
- 4. L. Beilina, Adaptive Finite Element/Difference Method for inverse elastic scattering waves, *Applied and Computational Mathematics*, V.2, pp.119-134, 2003.
- 5. L. Beilina, S. Korotov, M. Krizek, Local Nonobtuse tetrahedral refinement techniques near Ficheralike corners. *Applications of Mathematics*, N.50, pp. 569-581, 2005.
- 6. L. Beilina, C. Johnson, A posteriori error estimation in computational inverse scattering, *Mathematical Models and Methods in Applied Sciences*, V.15, N.1, pp.23-37, 2005.

- 7. L. Beilina and C. Clason, An adaptive hybrid FEM/FDM method for an inverse scattering problem in scanning acoustic microscopy, *SIAM Sci.Comp.*, V.28, I.1, pp.382-402, 2006.
- 8. L. Beilina, M. V. Klibanov, A globally convergent numerical method for some coefficient inverse problems with resulting second order elliptic equations, *SIAM Sci.Comp.*, V.31, N.1, 478-509, 2008.
- 9. L. Beilina, M. P. Hatlo, H. E. Krogstad, Adaptive algorithm for an inverse electromagnetic scattering problem, *Applicable Analysis*, V.88, N.1, 15-28, 2009.
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