

Curriculum Vitae of Nuutti Hyvönen

Contact information

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Personal information

Born November 19th, 1977 in Kuopio, Finland. Married to Merja Oja since January 2007.

Language skills

Finnish (mother tongue), English (excellent), Swedish (basic), Latin & Russian (elementary).

Education

Doctor of Science in Technology June 2004
Department of Engineering Physics and Mathematics, Helsinki University of Technology.
Major: mathematics. Minor: information science.
Thesis: *Diffusive tomography methods: Special boundary conditions and characterization of inclusions* (pass with distinction, opponent: Prof. Martin Hanke).

Master of Science in Technology December 2000
Department of Engineering Physics and Mathematics, Helsinki University of Technology.
Major: mathematics. Minor: information science.
Thesis: Analysis of optical tomography with non-scattering regions.

Matriculation examination June 1996
Otavan opiston aikuislukio, Mikkelin maalaiskunta.

Professional experience

Full Professor 1.7.2017 onwards
Dept. of Mathematics and Systems Analysis Aalto University
Head of the Inverse Problems Research Group.

Associate Professor (tenured) 1.12.2012–30.6.2017
Dept. of Mathematics and Systems Analysis Aalto University
Head of the Inverse Problems Research Group.

Academy Research Fellow 1.8.2010–30.11.2012
Dept. of Mathematics and Systems Analysis Aalto University
Head of the Inverse Problems Research Group.

Researcher 1.1.2010–31.7.2010
Dept. of Mathematics and Systems Analysis Aalto University
Head of the Inverse Problems Research Group.

Postdoctoral researcher 1.1.2007–31.12.2009
Institute of Mathematics Helsinki University of Technology
Academy of Finland, postdoctoral researcher's project: *Diffuse tomography — theory and algorithms*.
Head of the Inverse Problems Research Group from January 2009 onwards.

Visiting scholar Department of Mathematics Host: Prof. John Sylvester.	1.1.2008–21.12.2008 University of Washington, USA
Researcher Institute of Mathematics Postdoctoral research funded by the Finnish Funding Agency for Technology and Innovation and the Academy of Finland.	1.9.2005–31.12.2006 Helsinki University of Technology
Researcher/assistant Institute of Mathematics Teaching and writing doctoral thesis.	1.1.2001–31.7.2004 Helsinki University of Technology
Research/teaching assistant Institute of Mathematics Teaching and writing master's thesis.	1.6.1999–31.12.2000 Helsinki University of Technology
Part-time teacher Institute of Mathematics Giving tutorials.	1997–1998 Helsinki University of Technology

Funding ID

Uncertainty quantification in electrical impedance tomography, Academy of Finland, September 2013 – August 2017. Role: Principal Investigator. Funding: 457 423 EUR.

Starting grant of a tenured Associate Professor, Aalto University, January 2013 – December 2015. Funding: 150 000 EUR.

Fine-tuning of a realistic measurement model in electrical impedance tomography, Academy of Finland and Deutsche Forschungsgemeinschaft, January 2011 – December 2013. Role: Finnish Principal Investigator. German Principal Investigator: Prof. Andreas Rieder, Karlsruhe Institute of Technology. Funding of the Finnish team: 205 730 EUR.

Inverse problems with incomplete data, Academy of Finland, August 2010 – November 2012 (position as an Academy Research Fellow plus research costs). Role: Principal Investigator. Funding: 608 300 EUR. Note: The research cost funding run until July 2013.

Diffuse tomography: theory and algorithms, Academy of Finland, January 2007 – December 2009 (postdoctoral project). Role: Principal Investigator. Funding: 180 000 EUR.

Scientific responsibilities

Head of the Inverse Problems Research Group at the Aalto University (January 2009 onwards).

Reviewer for the Swedish Foundation for Strategic Research, the Austrian Science Fund, and the Czech Science Foundation.

Responsible researcher at the Aalto University in the project *Inverse Problems and reliability of the measurements* (40370/08) funded by the Finnish Funding Agency for Technology and Innovation (January 2009 – December 2011).

Responsible researcher at the Helsinki University of Technology in the project *Inverse Problems and reliability of the measurements* (40233/07) funded by the Finnish Funding Agency for Technology and Innovation (the year 2009).

Pre-examiner of Andreas Hauptmann's PhD Thesis (University of Helsinki, 2017).

Examiner of Dmitry Ponomarev's PhD Thesis (Nice Sophia Antipolis University, 2016).

Examiner of Henrik Garde's PhD Thesis (Technical University of Denmark, 2016).

Examiner of Marcel Ullrich's PhD Thesis (University of Stuttgart, 2015).

Pre-examiner of Meghdoot Mozumder's PhD Thesis (University of Eastern Finland, 2015).
Evaluator of Markus Harju's docent application (University of Oulu, 2014).
Pre-examiner of Paul Hadwin's PhD Thesis (University of Auckland, 2014).
Evaluator of Miren Zubeldia's docent application (University of Helsinki, 2014).
Opponent at the public defence of Anssi Lehtikainen's doctoral thesis (University of Eastern Finland, 2012).
Pre-examiner of Valter Pohjola's licentiate thesis (University of Helsinki, 2013).
Pre-examiner of Eemeli Blåsten's licentiate thesis (University of Helsinki, 2010).
Evaluator of Hanna Pikkarainen's docent application (University of Helsinki, 2010).
Pre-examiner of Markus Harju's licentiate thesis (University of Oulu, 2005).
Reviewer for Inverse Problems (29 manuscripts), Inverse Problems and Imaging (7), SIAM Journal on Applied Mathematics (2), SIAM Journal on Mathematical Analysis (2), Numerische Mathematik (2), IEEE Transactions on Medical Imaging (2), Inverse Problems in Science and Engineering (2), Measurement Science and Technology (2), BIT Numerical Mathematics (1), Scientific Reports (1), Journal of Complexity (1), Complex Variables and Elliptic Equations (1), Journal of Mathematical Biology (1), Journal of Mathematical Imaging and Vision (1), Journal of Integral Equations and Applications (1), Applied Numerical Mathematics (1), International Journal of Heat and Mass Transfer (1), Computational and Mathematical Methods in Medicine (1), Boundary Value Problems (1), Biomedical Optics Express (1), Artificial Intelligence in Medicine (1), Rakenteiden Mekaniikka (1).

Comissions of trust

Member of the board of the Finnish Centre of Excellence in Inverse Problems Research (January 2009 – December 2017).
Member of the board of the Finnish Inverse Problems Society (December 2011 onwards).
Member of the board of the Graduate School of Inverse Problems (January 2010 – December 2013).

Institutional responsibilities

Vice head of the Department of Mathematics and Systems Analysis, School of Science, Aalto University (2017 onwards).
Head of the Master's Programme in Mathematics and Operations Research, School of Science, Aalto University (2014–2017).
Twice the Chair of a Departmental Tenure Track Committee at the Department of Mathematics and Systems Analysis, School of Science, Aalto University (2014–2015 and 2017–2018). Member of three other tenure track committees in Aalto School of Science.
Member of the Steering Group, School of Science, Aalto University (January 2015 onwards).
Member of the Steering Group of Study Matters, School of Science, Aalto University (January 2015 onwards).
Member of the Steering Group of Department of Mathematics and Systems Analysis, School of Science, Aalto University (January 2014 onwards).
Member of the Degree Programme Committee of Engineering Physics and Mathematics, School of Science, Aalto University (January 2013 onwards). Vice-chair.
Member of the Degree Programme Committee of Bachelor's Programme in Science and Technology, School of Science, Aalto University (January 2013 – February 2016). Deputy member (January 2017 onwards).
Deputy member of the Academic Committee for Science, School of Science, Aalto University (January 2014 onwards).

Awards and grants

Recognition of Outstanding Refereeing Performance, Inverse Problems, 2009.
Travel grant of 4000 EUR, Finnish Foundation for Technology Promotion, 2008.
Travel grant of 3000 EUR, Finnish Cultural Foundation, 2008.
Grant of 4000 EUR, Emil Aaltosen säätiö, 2004.
Finnish Inverse Prize (1600 EUR), Finnish Inverse Problems Society, 2003.
Grant of 2000 FIM, Student Union of Helsinki University of Technology, 1999.

Supervision of thesis projects

Supervisor of the doctoral thesis of Lauri Harhanen (2013).
Supervisor of the doctoral thesis of Otto Seiskari (2013).
Supervisor of the doctoral thesis of Stratos Staboulis (2014).
Supervisor of the doctoral thesis of Matti Leinonen (joint with Harri Hakula; 2015).
Supervisor of the doctoral thesis of Helle Majander (2016).
Supervisor of the doctoral thesis of Lauri Mustonen (2017).
Supervisor of the doctoral thesis of Mikael Laaksonen (Harri Hakula as instructor; an ongoing project).
Supervisor of the doctoral thesis of Valentina Candiani (an ongoing project).
Instructor of the master's thesis of Jaakko Hujanen, 2014.
Instructor of the master's thesis of Matti Leinonen, 2011.
Instructor of the master's thesis of Otto Seiskari, 2011. (The best master's thesis at the Aalto School of Science in 2011.)
Instructor of the master's thesis of Stratos Staboulis, 2010.
Instructor of the master's thesis of Lauri Harhanen, 2008 (Wacker Prize for the best mathematical master's thesis on an industrial project, European Consortium for Mathematics in Industry, 2008).

Teaching experience (Helsinki University of Technology/Aalto University)

Lecturer: Computational (methods in) inverse problems (2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017), Factorization and source support methods for electrical impedance tomography (2010), Finite difference methods (2005, 2013, 2014), Computational methods for differential equations (2015, 2016, 2017), Basic course in mathematics L4 (2013; with Juha Kinnunen), Partial Differential Equations (2013; with Ioannis Parissis), Matriisilaskenta (3×2014 , 3×2015).

Course assistant: Basic course in mathematics P2 (2004), Non-linear functional analysis (2003), Applied functional analysis (2003), Integral equations (2003), Inverse theory (2002), Basic course in mathematics L2 (2000), Basic course in mathematics L1 (1999).

Exercise assistant: Basic courses in mathematics L1/L2/L3/L4/C2/P2.

Research visits abroad

University of Delaware, Department of Mathematical Sciences, Newark, Delaware, USA, 12.–18.5.2012.
Host: Prof. Fioralba Cakoni.

Seoul National University, Department of Mathematical Sciences, Seoul, Republic of Korea, 30.3.–6.4.2009. Host: Prof. Hyeonbae Kang.

University of Washington, Department of Mathematics, Seattle, USA, the year 2008. Host: Prof. John Sylvester.

Rensselaer Polytechnic Institute, Department of Mathematical Sciences, Troy, USA, 29.9.–4.10.2008.
Host: Prof. David Isaacson.

National Technical University of Athens, Department of Mathematics, Athens, Greece, 23.–30.9.2007.
Host: Prof. Drossos Gintides.

Johannes Gutenberg-Universität, Institut für Mathematik, Mainz, Germany, 26.2.–5.4.2007, 21.–30.8.2007 and 16.–20.3.2009. Host: Prof. Martin Hanke.

University of Tsukuba, Institute of Mathematics, Japan, 31.1.–14.2.2007. Host: Prof. Hiroshi Isozaki.

Hosted research visits to Finland

Lucas Chesnel (eighteen months as a postdoctoral researcher), 1.3.2013–31.8.2014.

Jérémi Dardé (seventeen months as a postdoctoral researcher), 21.1.2011–30.6.2012.

Hari M. Varma (fifteen months as a postdoctoral researcher), 1.10.2010–31.12.2011.

Maia Lesosky (sixteen months as a postdoctoral researcher), 1.5.2009–31.8.2010.

Organized conferences, summer schools and special sessions

Distinguished Lectures on Inverse problems, August 4-8, 2014, Helsinki, Finland (member of the scientific organizing committee).

Inverse problems and uncertainty quantification (with Tapio Helin). In *SIAM Conference on Uncertainty Quantification, Lausanne, Switzerland, April 2016*.

Inverse problems in PDE and probability (with Tapio Helin). In *ICIAM 2015, Beijing, China, August 2015*.

Efficient reconstruction methods for electrical impedance tomography and inverse scattering (with Roland Griesmaier). In *Applied Inverse Problems, Helsinki, Finland, May 2015*.

Recent progress in inverse scattering and electrical impedance tomography (with Roland Griesmaier). In *Applied Inverse Problems, Daejeon, Korea, July 2013*.

Deterministic and probabilistic methods for inverse scattering and impedance tomography (with Roland Griesmaier). In *SIAM Conference on Imaging Science, Philadelphia, Pennsylvania, USA, May 2012*.

Shape reconstruction in impedance tomography and inverse scattering (with Roland Griesmaier). In *Applied Inverse Problems, College Station, Texas, USA, May 2011*.

Summer school on computational solution of inverse problems (with Samuli Siltanen, Matti Mänttä and Terhi Hautala), Helsinki, Finland, June 2010.

Electromagnetic imaging with limited data (with Roland Griesmaier). In *SIAM Conference on Imaging Science, Chicago, Illinois, USA, April 2010*.

Qualitative methods for imaging problems in electromagnetics (with Armin Lechleiter). In *SIAM Conference on Imaging Science, San Diego, California, USA, July 2008*.

Inverse problems arising from scattering phenomena (with Hanna Pikkarainen). In *Applied Inverse Problems, Cirencester, UK, June 2005*.

Statistical methods in EIT and X-ray tomography (with Hanna Pikkarainen). In *Applied Inverse Problems, Cirencester, UK, June 2005*.

Talks at international conferences and workshops

Invited talks:

1. Polynomial collocation for handling an inaccurately known measurement configuration in EIT. In *Theory and Numerics of Inverse Scattering Problems, Oberwolfach, Germany, September, 2016*.
2. Polynomial collocation for handling an inaccurately known measurement configuration in electrical impedance tomography. *International Conference on Computational Mathematics and Inverse Problems, Michigan Tech, USA, August, 2016*.
3. Simultaneous reconstruction of outer boundary shape and conductivity distribution in electrical impedance tomography. In *Advances in Uncertainty Quantification Methods, Algorithms and Applications (UQAW 2016), King Abdullah University of Science and Technology, Saudi Arabia, January 2016*.
4. Stochastic finite element method for electrical impedance tomography. In *Inverse Problems in Wave Propagation — IWaP 2015, Bremen, Germany, April 2015*.
5. Simultaneous reconstruction of body shape and conductivity in electrical impedance tomography. In *The Nineteenth Inverse Days, Inari, Finland, December 2013*.
6. Simultaneous reconstruction of body shape and conductivity in electrical impedance tomography. In *Biology and Mathematical Inverse Problems: A New Wedded couple?, Orleans, France, November 2013*.
7. Simultaneous reconstruction of outer boundary shape and conductivity distribution in electrical impedance tomography. In *Inverse Problems: Scattering, Tomography and Parameter Identification (Andreas Kirsch's 60th birthday), Bad Herrenalb, Germany, April 2013*.
8. Simultaneous reconstruction of outer boundary shape and conductivity distribution in electrical impedance tomography. In *Inverse problems and numerical methods in applications, Bremen, Germany, March, 2012*.
9. Electrical impedance tomography with two electrode. In *Inverse Problems for Partial Differential Equations, Oberwolfach, Germany, February, 2012*.
10. Electrical impedance tomography with two electrodes. In *Finnish–Japanese–Korean workshop on inverse problems, Helsinki, Finland, December 2011*.
11. A computational algorithm for locating inclusions with two electrodes of electrical impedance tomography. In *the annual general meeting of the Finnish Society of Computational Sciences (Sulatis), February 2011*.
12. The inverse backscatter problem in impedance tomography: unique identifiability and the backscattering support. In *Inverse Problems, Computation and Applications, CIRM Luminy, France, June 2010*.
13. Backscattering in electrical impedance tomography. In *MMNS Workshop on Inverse Problems for Waves: Methods and Applications, Paris, March 2010*.
14. Electrical impedance tomography: Backscattering and imaging of concrete. In *Trilateral workshop on inverse problem (China-Germany-Finland), Helsinki, March 2010*.
15. An inverse backscattering problem in electric impedance tomography. In *Finnish-Korean Symposium on Inverse Problems, Seoul, Republic of Korea, April 2009*.
16. Locating transparent cavities in optical absorption and scattering tomography. In *Inverse Problems in Wave Scattering, Oberwolfach, Germany, March 2007*.
17. Factorization method and weak inclusions in electrical impedance tomography. In *The 12th Annual Mathematical Analysis Seminar on Inverse Problems, Tsukuba, Japan, February 2007*.
18. Characterizing inclusions using a linear sampling method based on the complete electrode model of electrical impedance tomography. In *Workshop on Inverse Problems & Medical Imaging, Vancouver, Canada, August 2003*.

Invited talks in special sessions and minisymposia:

1. Polynomial surrogates for electrical impedance tomography. In *SIAM Annual Meeting, 2017*,

- Pittsburgh, USA, July 2017.
2. Efficient inclusion of edge-promoting priors in diffuse imaging. In *Applied Inverse Problems 2017, Hangzhou, China, June 2017*.
 3. Polynomial surrogates for electrical impedance tomography. In *Applied Inverse Problems 2017, Hangzhou, China, May 2017*.
 4. Optimal Electrode Positions in Electrical Impedance Tomography. In *SIAM Conference on Uncertainty Quantification, Lausanne, Switzerland, April 2016*.
 5. Simultaneous reconstruction of outer boundary shape and conductivity distribution in electrical impedance tomography. In *27th Nordic Congress of Mathematicians, Stockholm, Sweden, March 2016*.
 6. Optimization of electrode positions in electrical impedance tomography. In *Applied Inverse Problems, Helsinki, Finland, May 2015*.
 7. Stochastic Galerkin finite element method for electrical impedance tomography. In *SIAM Conference on Imaging Science, Hong Kong, China, July 2014*.
 8. Inverse conductivity problem in the plane: uniqueness by point measurements. In *International Conference on Inverse Problems and Related Topics, Nanjing, China, October 2012*.
 9. Inverse conductivity problem in the plane: Uniqueness by point measurements. In *SIAM Conference on Imaging Science, Philadelphia, Pennsylvania, USA, May 2012*.
 10. Detection of multiple inclusions from sweep data of electrical impedance tomography. In *Finnish Mathematics Days, Lappeenranta, Finland, January 2012*.
 11. Electrical impedance tomography with two electrodes. In *ICIAM 2011, Vancouver, Canada, July 2011*.
 12. Electrical impedance tomography with two electrodes. In *Fields-Mitacs Conference on Mathematics of Medical Imaging, Toronto, Canada, June 2011*.
 13. Justification of a point electrode model in electrical impedance tomography. In *Applied Inverse Problems, College Station, Texas, USA, May 2011*.
 14. Electrical impedance tomography with two electrodes. In *Applied Inverse Problems, College Station, Texas, USA, May 2011*.
 15. Convex backscattering support in electrical impedance tomography. In *The 8th AIMS Conference on Dynamical Systems and Differential Equations, Dresden, Germany, May 2010*.
 16. Backscattering in electrical impedance tomography. In *SIAM Conference on Imaging Science, Chicago, Illinois, USA, April 2010*.
 17. An inverse backscattering problem in electric impedance tomography. In *Applied Inverse Problems, Vienna, Austria, July 2009*.
 18. Approximating idealized measurement maps of electric impedance tomography by electrode data. In *Applied Inverse Problems, Vienna, Austria, July 2009*.
 19. Convex source support and its application to electric impedance tomography. In *SIAM Conference on Imaging Science, San Diego, California, USA, July 2008*.
 20. Convex source support and its application to electric impedance tomography. In *The 7th AIMS Conference on Dynamical Systems and Differential Equations, Arlington, Texas, USA, May 2008*.
 21. An implementation of the factorization method within the complete electrode model of electrical impedance tomography. In *Applied Inverse Problems, Vancouver, Canada, June 2007*.
 22. Locating transparent cavities in optical absorption and scattering tomography. In *Applied Inverse Problems, Vancouver, Canada, June 2007*.
 23. Factorization method and weak inclusions in electrical impedance tomography. In *Inverse Problems: Modeling and Simulation, Fethiye, Turkey, May 2006*.
 24. Factorisation method in optical tomography. In *Applied Inverse Problems, Cirencester, UK, June 2005*.
 25. Characterizing inclusions using a linear sampling method based on the complete electrode model of impedance tomography. In *Applied Inverse Problems, Lake Arrowhead, California, USA, June 2003*.
 26. Analysis of optical tomography with non-scattering regions. In *Applied Inverse Problems, Montecatini Terme, Italy, June 2001*.

Other talks:

- 1.Short history of Finnish mathematics. In *Fysikerfest 2017, Kuopio, Finland, October 2017*.
- 2.Inverse backscattering in electric impedance tomography. In *The Fifteenth Inverse Days, Luosto, Finland, December 2009*.
- 3.An output least squares algorithm for locating nonscattering regions in optical tomography. In *The Thirteenth Inverse Days, Lappeenranta, Finland, December 2007*.
- 4.An output least squares algorithm for locating nonscattering regions in optical tomography. In *The 8th International Workshop on Mathematical Methods in Scattering Theory and Biomedical Engineering, Lefkada, Greece, September 2007*.
- 5.An implementation of the factorization method within the complete electrode model of electrical impedance tomography. In *The Twelfth Inverse Days, Tampere, Finland, December 2006*.
- 6.Locating inclusions in electrical impedance tomography. In *BIT Numerical Mathematics Circus, Stockholm, Sweden, August 2006*.
- 7.Factorization method and purely absorbing inclusions in optical tomography. In *The Eleventh Inverse Days, Sodankylä, Finland, December 2005*.
- 8.Factorization method in optical tomography. In *The Ninth Inverse Days, Pudasjärvi, Finland, December 2003*.
- 9.Complete electrode model: approximation properties and characterization of inclusions. In *The Eighth Inverse Days, Nilsia, Finland, December 2002*.
- 10.Analysis of optical tomography with non-scattering regions. In *The Sixth Inverse Days, Savukoski, Finland, December 2000*.

Non-academic positions of trust

Member of Body of Representatives, Student Union of Helsinki University of Technology, 1998–2000.
Board member (fuksikapteeni), Guild of Physics Students at Helsinki University of Technology, 1998.

Competitions

Member of Finland's squad at the International Mathematical Olympiad in Bombay in 1996.
Third place in the competition in mathematics for Finnish high school students in 1995.
Fifth place in the competition in physics for Finnish high school students in 1995.

Conscription

Nonmilitary service at the Department of Mathematics and Statistics at University of Helsinki, 2.8.2004–31.8.2005.