Curriculum Vitae Tyni, <u>Teemu</u> (Assistant professor, Docent)

University of Oulu, Finland Applied and Computational Mathematics

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Education

Lappeenranta-Lahti University of Technology
Title of Docent, April 2025.
University of Oulu
PhD. in Applied mathematics, 2018.
MSc. in Applied mathematics, 2015.
B.S. in Mathematics, 2013.
Dissertation: "Direct and inverse scattering problems for perturbations of the biharmonic operator"
Opponent: Prof. David Colton (Univ. of Delaware, USA)

Current employment

Research Unit of Applied and Computational Mathematics, University of Oulu, Finland Assistant Professor, July 2023– Visiting researcher at the University of Helsinki 2023–

Selected previous work experience

Dept. of Mathematics, University of Toronto, Canada Post-doctoral fellow, August 2021 – June 2023. Contact: Professor Spyros Alexakis Dept. of Mathematics and Statistics, University of Helsinki, Finland Post-doctoral researcher, 2019-2021. Contact: Professor Matti Lassas Dept. of Math. Sciences, University of Oulu, Finland Post-doctoral researcher, 2018-2019. PhD. student, 2015-2018. Contact: Professor Valery Serov, Docent Markus Harju Sodankylä geophysical observatory, Finland Researcher, 2014 Contact: Professor Lassi Roininen Dept. of Physics, University of Oulu, Finland Research assistant at electron spectroscopy group, 2013 Contact: Dr. Lauri Hautala

Research funding

- My research group is part of the FAME Flagship of Research Council of Finland with funding of 67600€ by Reseach Council of Finland and 43750€ by University of Oulu (2024–2027) https://www.aka.fi/en/about-us/whats-new/press-releases/2023/research-council-of-finland-selectsfour-new-finnish-flagships/
- 2. My research group is part of the DREAM doctoral education pilot with funding of approximately 72250€/year for 3 years (2025–2027). https://www.oulu.fi/en/research/graduate-school/doctoral-education-pilot
- 3. I was awarded 200000€ research project grant by the Emil Aaltonen foundation (Emil Aaltosen säätiö) in 2023
 https://amilaaltonen.f/projektionumbet 2022/

https://emilaaltonen.fi/projektiapurahat-2023/

 I received 32500€ personal research fund from the Emil Aaltonen foundation (Emil Aaltosen säätiö) in 2021

https://emilaaltonen.fi/wp-content/uploads/2021/05/saajaluettelo.pdf

5. I was awarded a four (4) year funding towards the completion of my PhD research in 2015 by Exactus (University of Oulu, Doctoral programme in Exact Sciences). The amount of funding corresponded to full salary for four years. Supervisors: Professor Valery Serov and docent Markus Harju.

Selected recent scientific talks

- 1. Conference talk at AIP2023 (Göttingen, Germany) http://www.aip2023.com/program/
- 2. Invited talk at IWOTA2023 (Helsinki, Finland) https://www.helsinki.fi/en/conferences/iwota2023/program
- 3. Conference talk at IPMS2022 (Malta) https://www.ipms-conference.org/ipms2022/conference-program/conference-program
- Invited talk at International Zoom Inverse Problems seminar in February 2022, (University of California, Irvine, USA)

https://sites.uci.edu/inverse/teemu-tyni-university-of-toronto/

5. Invited talk at Inverse Problems and Nonlinearity online conference in August 2021, (Jyväskylä, Finland)

https://www.jyu.fi/science/en/maths/research/inverse-problems/inverse-problems-and-nonlinearity-2020

PhD supervision

MSc. Suvi Takalahti (on-going 2024-present, on Emil Aaltonen project grant) MSc. Khaoula El Maddah (on-going 2025-present, in DREAM doctoral pilot)

Master's thesis supervision

MSc. Manu Holmberg, (co-supervisor with prof. Matti Lassas) completed in 2020

Teaching

ITEE., University of Oulu

Lecturer (coordinator), Differential Equations 2024-present Lecturer (coordinator), Mathematical structures for computer science 2023 Dept. of Math., University of Toronto Instructor (Lecturer), Calculus 2 (MAT136) 2022-23 Instructor (Lecturer), Calculus 1 (MAT135) 2021-22 Dept. of Math. and Statistics, University of Helsinki Teaching assistant, Partial differential equations 2021 (Zoom) Lecturer, Inverse Problems II: Tomography and regularization 2020 Lecturer, Mathematics everywhere (MOOC) 2020 Lecturer, Latex course (online course) 2020 Lecturer, Recap of high school math. (online course) 2020 Lecturer, Inverse Problems II: Tomography and regularization 2019 Unit of Math. Sciences, University of Oulu Lecturer, Introduction to LaTeX 2018–19 Teaching assistant, Complex analysis II 2018 Lecturer, Laboratory exercises in physics 1, Intro. to LaTeX 2018-19 Teaching assistant, Operator theory and integral equations 2017 Teaching assistant, Series and the integral 2017 Teaching assistant, Derivative 2016 Teaching assistant, A second course in differential equations 2015 Teaching assistant, Introduction to real functions 2015–16 Teaching assistant, Introduction to mathematical deduction 2015–16

Awards

• I received the Finnish Inverse Prize (2000€) for my PhD work in 2018. https://www.fips.fi/fipsprize.php

Other academic merits

- 1. I am a member of the board (treasurer) of Finnish Inverse Problems Society https://www.fips.fi/governors.php
- 2. I am an active referee for the journals: Inverse Problems, Inverse Problems & Imaging, SIAM Journal on Applied Mathematics, and Inverse Problems in Science & Engineering.
- 3. Organizing conferences:
 - With prof. Hauptmann I am a main organizer of "Inverse Days, 2024" in Oulu.
 - I organized a minisymposium at the "Applied Inverse Problems AIP2023" conference at Göttingen, Germany, 2023. http://www.aip2023.com/program/

• I organized a minisymposium at the "Inverse Problems: Modeling and Simulations" conference at Malta, 2022.

https://www.ipms-conference.org/ipms2022/m27

- I was part in organizing committee of the online conference "Inverse Problems and Nonlinearity", Helsinki 2020. https://www.jyu.fi/science/en/maths/research/inverse-problems/inverse-problems-and-nonlinearity-
- 2020I took significant part in the organizing committee of the conference "Inverse Days, 2017" in Oulu.

List of publications Tyni, <u>Teemu</u>

Please find the up-to-date list of publications on my personal web page: https://www.mv.helsinki.fi/home/tyniteem/research/

A. Peer-reviewed scientific articles

- 1. Lin Y-H, Tyni T, and Zimmerman P, *Well-posedness and inverse problems for semilinear nonlocal wave equations*, Nonl. anal., **247**, 113601, 2024.
- 2. Lassas M, Liimatainen T, Potenciano-Machado L, and Tyni T, *Stability and Lorentzian geometry for an inverse problem of a semi-linear wave equation*, Analysis & PDE (in press), 2024.
- 3. Alexakis S., Stinchcombe, A., and Tyni T. *A boundary integral equations approach to electrical impedance tomography: experiments on the KTC2023 data*, AIMS Appl. Math. Mod. Chal., **2**:2, 228–242. Doi: 10.3934/ammc.2024006, 2024.
- 4. Tyni T, Stinchcombe A R, and Alexakis S, *A boundary integral equation method for the complete electrode model in electrical impedance tomography with tests on real-world data*, SIAM J. Imag. Sci, **17**:1, 2024. DOI: 10.1137/23M1585696
- 5. Covi G, Railo J, Tyni T, and Zimmerman P, *Stability estimates for the inverse fractional conductivity problem*, SIAM J. Math. Anal. **56**:2, 2024. DOI: 10.1137/22M1533542
- 6. Lassas M, Liimatainen T, Potenciano-Machado L, and Tyni T, *An inverse problem for a semi-linear wave equation: a numerical study*, Inv. Prob. Imag. **18**:1, 62–85, 2024. DOI: 10.3934/ipi.2023022
- Lassas M, Liimatainen T, Potenciano-Machado L and Tyni T, Uniqueness, reconstruction and stability for an inverse problem of a semi-linear wave equation, J. Differ. Equ., 337, 395-435, 2022. DOI:10.1016/j.jde.2022.08.010
- 8. Liimatainen T, Lin Y-H, Salo M and Tyni T, *Inverse problems for elliptic equations with fractional power type nonlinearities*, J. Differ. Equ., **306**, 189-219, 2022. DOI: 10.1016/j.jde.2021.10.015
- 9. Harju M, Kultima J, Serov V and Tyni T, *Two-dimensional inverse scattering for quasi-linear biharmonic operator*, Inverse Prob. Imag. **15**(5) 1015-1033, 2021. DOI: 10.3934/ipi.2021026
- 10. Brander T, Ilmavirta J, Piiroinen P and Tyni T, *Optimal recovery of a radiating source with multiple frequencies along one line*, Inverse Prob. Imag. **14**(6): 967-983, 2020. DOI: 10.3934/ipi.2020044
- 11. Tyni T, *Numerical results for Saito's uniqueness theorem in inverse scattering theory*, Inverse Problems, **35**(6), 065002, 2020. DOI: 10.1088/1361-6420/ab7d2d
- 12. Serov V and Tyni T, *Inverse medium problem for a singular contrast*, J. Math. Phys. **60**, 111508, 2019. DOI: 10.1063/1.5097915

- 13. Tyni T and Serov V, *Inverse scattering problem for quasi-linear perturbation of the biharmonic operator on the line*, Inverse Prob. Imag., **13**(1): 159–175, 2018. DOI: 10.3934/ipi.2019009
- 14. Tyni T, *Recovery of singularities from a backscattering Born approximation for a biharmonic operator in 3D*, Inverse Problems, **34**, 045007, 2018. DOI: 10.1088/1361-6420/aaaf7f
- 15. Tyni T and Serov V, *Scattering problems for perturbations of the multidimensional biharmonic operator*, Inverse Prob. Imag., **12**(1): 205–227, 2018. DOI: 10.3934/ipi.2018008
- 16. Tyni T and Harju M, *Inverse backscattering problem for perturbations of biharmonic operator*, Inverse Problems, **33**, 105002, 2017. DOI: 10.1088/1361-6420/aa873e
- 17. Serov V and Tyni T, *Inverse Scattering Problems for Perturbed Bi-harmonic Operator*, AIP Conference Proceedings 1776, 2016. DOI: 10.1063/1.4965410
- 18. Tyni T, Harju M and Serov V, *Recovery of singularities in fourth order operator on the line from limited data*, Inverse Problems, **32**, 075001, 2016. DOI: 10.1088/0266-5611/32/7/075001

B. Non-refereed scientific articles and preprints

- 1. Alexakis S, Isozaki H, Lassas M, and Tyni T, Inverse scattering problems for non-linear wave equations on Lorentzian manifolds, Preprint arxiv:2411.09354, November, 2024.
- 2. Lin Y-H, Tyni T, and Zimmerman P, *Optimal Runge approximation for nonlocal wave equations and unique determination of polyhomogeneous nonlinearities*, Preprint arxiv:2408.13869, August, 2024.

Theses

- 1. Tyni T, Direct and inverse scattering problems for perturbations of the biharmonic operator, Doctoral dissertation, Acta Universitatis Ouluensis. A, Scientiae rerum naturalium, 725, Oulu, 2018.
- 2. Tyni T, *Direct and inverse scattering problems for operator of order 4 on the line*, Master's thesis, Oulu, 2015.