

Oleksandr Bondarenko

Ph. D. Candidate in Applied Mathematics

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Education

Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

March 2011 to April 2016

Doctor of Philosophy, Mathematics (Grade: 1.0)

Dissertation: The Factorization Method for Conducting Transmission Conditions

Advisor: Andreas Kirsch

Virginia Polytechnic Institute and State University (Virginia Tech), Blacksburg, VA, USA

August 2009 to December 2010

Master of Science, Mathematics (GPA 4.0/4.0)

Master's Thesis: Optimal Control for an Impedance Boundary Value Problem

Advisors: Jeff T. Borggaard, Andreas Kirsch

Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany

October 2004 to August 2009

Intermediate Diploma in Computer Science and Mathematics

Research Interests

- Wave propagation phenomena and the scattering theory.
- Numerical analysis methods: Finite Element Method, Boundary Integral Equations Method.
- Inverse problems, regularization methods.
- Asymptotic methods.

Related Experience

Research

Pre-Doctoral Fellow/Ph.D. Research, Department of Mathematics, KIT

March 2011 to present

- Study of the direct and inverse scattering.
- Justification of the Factorization Method, an inverse problem solution algorithm, for the detection of scattering objects covered by a thin highly conductive layer. Applications: land mine detection, radar, seismic imaging.
- Implementation of the forward scattering problems in MATLAB via coupling of finite element and integral equation methods, and with the use of the FreeFem++ package.
- Use of asymptotic methods to derive the conductive boundary conditions. Numerical validation of the results.

Teaching

Problem Sessions Instructor, Department of Mathematics, KIT

March 2011 to present

- Undergraduate level courses: Advanced Mathematics II and III for Mechanical Engineers and Chemical Engineers, 800+ participants. Designed homework and tutorial assignments, coordinated tutors, held weekly problem sessions.
- Graduate level courses: Inverse Problems, Integral Equations, Scattering Theory, Introduction into Maxwell's Equations.

Teaching Assistant, Department of Mathematics, Virginia Tech

September 2009 to December 2010

- Math Emporium Teaching Assistant: assisted students on math courses ranging from Calculus to Ordinary Differential Equations.
- Instructor of Math 2015: Elementary Calculus with Trigonometry II.

Student Assistant,
Department of Mathematics, KIT

November 2006 to June 2009

- Tutor of Mathematics I/II for Information Engineering and Management.

Software Development

Software Developer, Computer Consult Wening,
Karlsruhe, Germany

February 2005 to March 2007

- Maintained existing projects. Programming languages: Java and C#.

Student Assistant, Martin-Luther-Universität Halle-
Wittenberg, Halle (Saale), Germany

December 2003 to February 2004

- Developed and designed two websites with php/mysql support for Interdisciplinary Center of Material Sciences.

Awards

Faculty Teaching Award (shared with T.Arens, F.Hettlich and T.Roesch) for
teaching the courses "Inverse Problems" and "Integral Equations".

April 2015

Research Travel Grant from the Karlsruhe House of Young Scientists for a 3
months research stay in the University of Delaware (UD), Newark, USA.

November 2014

The article "The Factorization Method for Inverse Acoustic Scattering in a Layered
Medium" has been added to the **Insights Collection** of the Inverse Problem Journal.

May 2013

Publications

Submitted

O. Bondarenko, A. Kirsch, *The Factorization Method for Inverse Scattering by a Penetrable
Anisotropic Obstacle with Conductive Transmission Conditions*. Inverse Problems.

Published in Referred Journals

O. Bondarenko, I. Harris, A. Kleefeld, *Existence of an Infinite Set of Transmission Eigenvalues
for a Problem with Conductive Boundary Conditions*. Applicable Analysis (accepted).

O. Bondarenko, X. Liu, *The Factorization Method for Inverse Obstacle Scattering with
Conductive Boundary Conditions*. 2013, Inverse Problems, 29/9.

O. Bondarenko, A. Kirsch, X. Liu, *The Factorization Method for Inverse Acoustic Scattering in a
Layered Medium*. 2013, Inverse Problems, 29/4.

Research Visits

University of Delaware, Newark, USA

June 2015 to September 2015

Host: Fioralba Cakoni. Duration: 3 months. Project goal: to prove the existence and discreteness of
interior transmission eigenvalues for an interior eigenvalue problem.

Chinese Academy of Sciences, Beijing, China

September 2014

Host: Xiaodong Liu. Duration: 1 month. Goal: share and discuss ideas on simplification of the proof
of the Factorization Method.

Skills

Programming: Matlab, Python (scypi/numpy), Java, C#, C++ (basics).

Operating Systems: Linux, OS X.

Software: LaTeX, FreeFem++.

Languages: Russian (native), German (near native), English (fluent), French (conversational).

*Talks/
Presentations*

The Factorization for Inverse Scattering by a Penetrable Anisotropic Obstacle with a Conductive Boundary Condition, Chinese Academy of Sciences, Beijing, September 10, 2014.

The Factorization Method for Inverse Acoustic Scattering in a Layered Medium.
IMSE Conference, Karlsruhe, July 25, 2014.

Excerpts from the brochure of Vladimir Arnold "Rigid and Soft Mathematical Models".
AG Inverse Probleme, Karlsruhe, July 27, 2013.

The factorization method for inverse acoustic scattering in a layered medium.
International Conference on Inverse Problems and Related Topics, Nanjing, October 25, 2012.

Optimal Control for an Impedance Boundary Value Problem. SIAM Student Chapter at
Virginia Tech, November 11, 2010.

References

Andreas Kirsch, Mathematics, Karlsruhe Institute of Technology, Ph.D. Advisor
(andreas.kirsch@kit.edu).

Fioralba Cakoni, Mathematics, Rutgers University (fiora.cakoni@rutgers.edu).

Jeff T. Borggaard, Mathematics, Virginia Tech, Master's Thesis Advisor (jborggaard@vt.edu).

Frank Hettlich, Mathematics, Karlsruhe Institute of Technology (frank.hettlich@kit.edu).

April 26, 2016