

Mark Hubenthal

cell: (425) 328-8895 website: www.math.washington.edu/~hubenjm email: hubenjm@math.washington.edu

Contact Information Department of Mathematics
University of Washington
Box 354350
Seattle, WA 98195-4350

Education **University of Washington**

- Ph.D. in Mathematics, expected 2012. *Thesis Advisor:* Gunther Uhlmann
- M.S. in Mathematics, 2011.

Whitman College

- B.A. in Mathematics, 2006.
- B.A. in Physics, 2006.

Research Interests

- Inverse transport and diffusion problems and applications to medical imaging
- Numerical work in computing forward solutions to PDEs and reconstruction of parameters
- Microlocal analysis and applications to edge detection in imaging with partial data
- Differential geometry, applied functional analysis, inverse problems

Research **Inverse Problems** 2009-Present
Advisor: Gunther Uhlmann. Considered the partial data case in recovering a radiative source modelled by the radiative transfer equation. Also investigated photoacoustic tomography - specifically an inverse problem with internal measurements. Worked on obtaining partial data results and on improving the regularity assumptions in an existing uniqueness theorem.

Optimization Related to Protein Folding Spring 2009
Advisor: Paul Tseng. Investigated the use of various techniques in optimization such as SDP-relaxation in order to minimize the energy function for particular proteins. Joint work with David Baker of the Biochemistry Department.

Inverse Problem for the Time-Dependent Heat Equation Summer 2005
Advisor: Kurt M. Bryan. Mathematics REU at Rose-Hulman Institute of Technology. Worked on locating one or more circular inclusions inside a two-dimensional region by using the time-dependent heat equation. Heat data on the boundary is used to numerically determine the size and position of the inclusion(s).

Perfectly Matched Layer Absorbing Boundary for Wave Equation Summer 2004
Advisor: Fadil Santosa. REU at University of Minnesota Supercomputing Institute. Finite difference methods are utilized in conjunction with the perfectly matched layer absorbing boundary to model the propagation of waves in an infinite medium.

Papers

- M. Hubenthal. An inverse source problem in radiative transfer with partial data. *Inverse Problems*, **27** (2011), 125009.
- D. Brown, M. Hubenthal. Time dependent thermal imaging of circular inclusions. (2005) preprint.

Invited Talks

- University of Washington Current Topics Seminar, Seattle, WA, May 2011.
- University of Washington Graduate Analysis Seminar, Seattle, WA, February 2011.
- Pacific Northwest National Laboratories Research Seminar, Richland, WA, February 2011.

Conferences & Workshop Participation

- Recent Advances in Biomedical Imaging. Shanghai Jiaotong University. *Shanghai, China*, August 15-19, 2011.
- RTG IPDE Summer School. University of Washington. *Seattle, WA*, June 2011.
- Applied Inverse Problems Conference. Texas A&M University. *College Station, TX*. May 23-27, 2011.
- Inverse Problems: Theory and Applications. Mathematical Sciences Research Institute (MSRI). *Berkeley, CA*, November 2010.

- Inverse Problems Residency. MSRI. *Berkeley, CA*. August 18 - September 17, 2010.
- Introductory Workshop on Inverse Problems and Applications. MSRI. *Berkeley, CA*. August 2010.
- Microlocal Analysis Workshop. Rensselaer Polytechnic Institute (RPI). *Troy, NY*. August 2010.
- RTG IPDE Summer School. University of Washington. *Seattle, WA*. July 2010.
- AMS MAA Joint National Meetings. *San Francisco, CA*. January 2010.
- Mathematical Methods in Emerging Modalities of Medical Imaging. Banff International Research Station (BIRS). *Banff, AB, Canada*. October 2009.
- Summer School on Seismic Imaging. *University of Washington*. August 2009.
- Workshop in Inverse Problems. MSRI. *Berkeley, CA*. July 2009.
- West Coast Optimization Meeting. *University of Washington*. May 2009.
- AMS Fall Western Sectional Meeting. *University of British Columbia*. October 2008.
- Pacific Northwest Geometry Seminar. *University of Washington*. May 2008.

Teaching

University of Washington

Summer 2010, Summer 2011

RTG IPDE Summer School TA. 2010: Taught a short Matlab tutorial to students of professor Hart Smith working on discrete Fourier analysis with the application of JPEG image compression. Assisted professor Leonid Kunyansky in a week-long series of computer tutorials on inverting the X-ray transform. 2011: Led recitations on pseudodifferential operators and distribution theory related to the integral ray transform. Also helped with Matlab tutorials investigating the X-ray transform, recovery of singularities, and generalization to other families of curves.

University of Washington

Summer 2008, Summer 2009, Fall 2010

Instructor. Taught one quarter each of Math 125 and Math 126, an introduction to integral Calculus and its applications, and an introduction to multivariable Calculus with vector geometry, respectively. Recently taught a quarter of Math 307, an introduction to differential equations.

University of Washington

2006-Present

Teaching Assistant. Lead quiz sections in Math 111 (Business Algebra) and Math 124/125/126 (Calculus). Also held office hours and acted as grader for Math 441 (Topology).

Honors and Awards

- RTG (Inverse Problems and PDE) Graduate Fellowship, University of Washington, 2009, 2010, 2011.
- Barry Goldwater Scholar, Whitman College, 2005-2006.
- Rank 425 on William Lowell Putnam Exam, 2005.

Qualifications

- *Programming Languages*: C++, Matlab
- *Operating Systems*: Linux, Windows, Unix
- *Libraries and Tools*: L^AT_EX, MatLab, Maple, HTML
- *Languages*: English (native), intermediate Spanish, beginning Mandarin, French (reading knowledge)

References

- Available upon request