Debdeep Bhattacharya

CONTACT INFORMATION

Department of Mathematics
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RESEARCH INTERESTS

Analysis of partial differential equations, especially nonlinear dispersive equations, solid mechanics, signal processing and machine learning

EDUCATION

Department of Mathematics, The George Washington University

Graduate Student, Mathematics (Ph.D. expected in May 2020)
Advisors: Prof. Frank Baginski and **Prof. Svetlana Roudenko**

Tata Institute of Fundamental Research Centre for Applicable Mathematics, Bengaluru, India

Master of Science (MSc) in Mathematics, May 2014

Indian Statistical Institute, Bengaluru, India

Bachelor in Mathematics, May 2012

SUMMER RESEARCH EXPERIENCE

University of Hawaii at Manoa

Visiting Scholar, Summer 2018
Supervisor: Prof. Peter Gorham

Oak Ridge National Laboratory

Mathematical Sciences Graduate Internship (MSGI), National Science Foundation (NSF), Summer 2019
Supervisor: Dr. Pablo Seleson

PUBLICATIONS

- **Global well-posedness of the mZK equation in 2 dimensions for low-regularity data** with Luiz Gustavo Farah and Svetlana Roudenko (Submitted)
- **Mass concentration of H^s blowup solution to 2D modified Zakharov-Kuznetsov equation** with Luiz Gustavo Farah (Preprint)
- **Generalized ForWaRD algorithm for multi-antenna model** (Preprint)
- **Reduction of three-dimensional axisymmetric problems to two dimensions in Peridynamics** with Pablo Seleson and Jeremy Trageser (Preprint)
- **Permutation-invariant encoding of data in Eulidean space** with Radu Balan and Naveed Haghani (In preparation)

REPORTS

- **Deconvolution problem and application to ANITA signals**, submitted to ANITA collaboration at University of Hawai'i at Manoa (link)
- **Reduction of three-dimensional axisymmetric problems to two dimensions in Peridynamics**, submitted to the NSF as part of MSGI program (link)

Honors and Awards

- Dean's Conference Travel Grant, The George Washington University, 2017
- Columbian College of Arts of Sciences Fellowship, The George Washington University, 2015 – present
- Junior Research Fellowship from Tata Institute of Fundamental Research, India, 2012–2014
- INSPIRE Scholarship from Department of Science and Technology, Government of India, 2010-2012
- Student Fellowship from Indian Statistical Institute, 2009-2012

Talks

- *Reduction of 3D axisymmetric models to 2D in peridynamics*, Computational and Applied Math (CAM) seminar, Computer Science and Mathematics Division, Oak Ridge National Laboratory, August 8, 2019
- *Fourier-Wavelet Regularized deconvolution (ForWaRD) in multi-antenna setup*, RIT in Applied Harmonic Analysis, Norbert Weiner Center, University of Maryland, May 13, 2019
- *Global Well-posedness of 2d Modified Zakharov-Kuznetsov Equation for Low-regularity Data*, Spring 2019 conference on Applied Mathematics, George Washington University, May 4, 2019
- *Deconvolution in a multi-antenna setup and application to ANITA data*, Antarctic Impulse Transient Anetann (ANITA) collaboration, December 10, 2018
- *Deconvolution problem and its application to ANITA data*, University of Hawai'i at Manoa, June 28, 2018
- *The I-method and its applications*, Graduate Student Seminar, The George Washington University, October 27, 2017

Poster Presentations

- *Fracture modeling in axisymmetric problems using peridynamics*, Oak Ridge Postdoctoral Association (ORPA) Research Symposium, Oak Ridge National Laboratory, August 6, 2019
- *Global Well-posedness of 2d Modified Zakharov-Kuznetsov Equation for Low-regularity Data*, 2019 Workshop on Nonlinear Dispersive Partial Differential Equations and Inverse Scattering, The Fields Institute, Toronto, Canada, May 21 - 24, 2019
- *Global Well-posedness of 2d Modified Zakharov-Kuznetsov Equation for Low-regularity Data*, GW Research Days, George Washington University, April 9, 2019

Teaching Experience

Fall	2019	Teaching assistant, Calculus III
Spring	2019	Teaching assistant, Calculus I
Fall	2018	Teaching assistant, Calculus II
Spring	2018	Teaching assistant, Calculus I
Fall	2017	Teaching assistant, Calculus with Pre-calculus I
Summer	2017	**Instructor**, Linear Algebra I
Spring	2017	Grader, Partial Differential Equation
Fall	2016	Teaching Assistant, Calculus I
Summer	2016	**Instructor**, Calculus with Pre-calculus I
Spring	2016	Teaching Assistant, Calculus for Social and Management Sciences
Fall	2015	Teaching Assistant, Calculus with Pre-calculus I

Programming Experience

github.com/debdeepbh

- **MATLAB** (Proficient) Numerical simulations of crack branching using peridynamics, finite difference methods for solving partial differential equations, signal processing using Fourier and wavelet analysis
- **Python** (Proficient) Machine learning using `scikit-learn`, `pandas` and `matplotlib`, automated theorem twitting twitter-bot
- **C++/C** (Fluent) Signal processing library `libWTools` using wavelet-based tools

- **R** (Fluent) Author of package `rexpense` to generate complex expense reports and statistics in a multi-user setup
- **BASH** (Proficient) 8+ years of experience as a Linux and BASH user

Responsibilities

- Organized GWU-SIAM conference on Applied Mathematics, April 29, 2017 with Eric Shehadi and Chong Wang
- Vice president of the SIAM chapter at the George Washington University, January 2016 - 2018

Conferences, Workshops and Projects

- 2019 Workshop on Nonlinear Dispersive Partial Differential Equations and Inverse Scattering, The Fields Institute, Toronto, Canada, May 21 - 24, 2019
- February Fourier Talks, February 21-22, 2019, University of Maryland, USA
- IAS/PCMI 2018 Summer Graduate School on Harmonic Analysis, July 1-21, 2018, Park City, Utah, USA
- February Fourier Talks, February 15-16, 2018, University of Maryland, USA
- Dispersive Equations, Solitons, and Blow-up, September 4 - 8, 2017, Hausdorff Center of Mathematica, Bonn, Germany
- French-American Conference on Nonlinear Dispersive PDEs, June 12 - 16, 2017, Centre International de Rencontres Mathematiques (CIRM), Luminy, Marseille, France
- Research School on 'Random Structures in Statistical Mechanics and Mathematical Physics', March 6 -10, 2017, Centre International de Rencontres Mathematiques (CIRM), Luminy, Marseille, France
- PDE/Analysis Mini School on 'Dynamics of the energy critical wave equations' by Thomas Duyckaerts, University of North Carolina, Chapel Hill, 13-15 February, 2017
- PDE/Analysis Mini School on 'Random Schrödinger operators: Basic properties, localization, and spectral statistics' by Peter Hislop, University of North Carolina, Chapel Hill, 27-28 October 2016
- Workshop on 'Getting Started with PDEs', The Hebrew University, Jerusalem, Israel, September 11 - September 15, 2016
- Third Chicago Summer School In Analysis, University of Chicago, June 13 - June 24, 2016
- PIRE-CNA 2016 Summer School on 'New Frontiers in Nonlinear Analysis for Materials', Carnegie Mellon University, Pittsburgh, June 2-10, 2016
- Workshop on Finite Element Method on Navier Stokes Equations, Indian Institute of Science, September, 2014
- Compact Course on Navier Stokes Equations, Tata Institute of Fundamental Research Centre for Applicable Mathematics (TIFRCAM), Bangaluru, India, June, 2014
- Completed a semester-long course on Mathematical Modelling at TIFRCAM, Bangaluru, India, August – December, 2012
- Advanced Instructional School on Analysis and Geometry, July, 2013, TIFRCAM, India
- ATM Workshop on Riemannian Geometry, 16th-28th July, 2012, TIFRCAM, India.
- Summer Research Programme at Indian Institute of Science Education and Research (IISER), Mohali, under the guidance of Prof. Kapil Hari Paranjape in 2011 on Differential Geometry

References

- **Prof. Frank Baginski**, Chair, Department of Mathematics, The George Washington University, Email: `baginski@gwu.edu`
- **Prof. Svetlana Roudenko**, Professor, Department of Mathematics and Statistics, Florida International University, Email: `sroudenko@fiu.edu`