# Debdeep Bhattacharya

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| CONTACT INFORMATION | Department of Mathematics<br>The George Washington University<br>2115 G Street, NW<br>Washington, DC, 20037 | Email:<br>debdeepbh@gwu.edu<br>Website:<br>http://debdeepbh.github.io |

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**

Ph.D. candidate, 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 Hawai'i 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 (To appear in Journal of Differential Equations) (arXiv:1906.05822)
- **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** with Frank Baginski (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 ACHIEVEMENTS | |
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| | • Dean's Graduate Conference Travel Grant, The George Washington University, 2017 |
| | • Columbian College of Arts of Sciences Fellowship, The George Washington University, 2015 – present |
| | • Prepared for and passed the highly competitive Joint Screening Test for National Board of Higher Mathematics (NBHM) scholarship, Fall 2014 |
| | • Secured an all-India rank 31 in National Eligibility Test (NET) jointly conducted by Council of Scientific and Industrial Research and University Grant Commission, Government of India, 2013 |
| | • 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**

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| 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 |

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| Programming Experience<br><br>**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<br>• **Python** (Proficient) Machine learning using `scikit-learn`, `TendorFlow 2.0`, `Keras`, `pandas` and `matplotlib`, automated theorem twitting twitter-bot<br>• **C++/C** (Fluent) Signal processing library `libWTools` using wavelet-based tools<br>• **R** (Fluent) Author of package `rexpense` to generate complex expense reports and statistics in a multi-user setup<br>• **BASH** (Proficient) 8+ years of experience as a Linux and BASH user |

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`, `TendorFlow 2.0`, `Keras`, `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

READING PROJECTS

- **Spring 2015:** Algebraic Topology at Indian Statistical Institute, Kolkata, course taught by Prof. Goutam Mukherjee
- **Summer 2011:** Differential Geometry at Indian Institute of Science Education and Research, Mohali, under the guidance of Prof. Kapil Hari Paranjape
- **Winter 2010:** Measure Theory at Indian Statistical Institute, Bangalore with Prof. K. Ramamurthy
- **Summer 2010:** Point Set Topology at Indian Statistical Institute, Kolkata with Prof. S. M. Srivastava

CONFERENCES AND WORKSHOPS

- 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 Re-

search 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.

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`