

Debananda Chakraborty

Department of Mathematics

New Jersey City University

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Education:

Doctor of Philosophy in Mathematics, State University of New York at Buffalo, 2012.

Thesis Title: *High Order Methods for Hyperbolic PDEs with Singular Source Term*

Master of Arts in Mathematics, State University of New York at Buffalo, 2006

Master of Science in Mathematics, Jadavpur University, India, 2001

Bachelor of Science in Mathematics, Jadavpur University, India, 1994

Academic and Professional Appointments:

September 2020 – Present:

Associate Professor, Department of Mathematics, [New Jersey City University](#)

September 2014 – August 2020:

Assistant Professor, Department of Mathematics, [New Jersey City University](#)

September 2012 - May 2014:

Assistant Professor, Department of Mathematics, Virginia Intermont College

September 2009 - July 2012:

Visiting Assistant Professor, Department of Mathematics, [State University of New York at Buffalo](#)

August 2003 - July 2004:

Lecturer, Department of Mathematics, Haldia Institute of Technology, India

September 1994 - November 1999:

System Engineer, G.S. Enterprise, Kolkata, India

Awards and Honors:

- Mini Grant Award, New Jersey City University, April 2015
- Who's Who Among Students in American Universities and Colleges, March 2012
- Professional Development Award, United University Professional, Buffalo Chapter, 2012
- Travel Grant Award, Society of Industrial and Applied Mathematics (SIAM), 2012

- Who's Who Among Students in American Universities and Colleges, March 2011
- Graduate Assistantship, Department of Mathematics, State University of New York at Buffalo, 2004
- Award of Merit for 1st Class 2nd in Master of Science, Jadavpur University, India, 2001

• ***Grants and Sponsorships:***

- **Co-Principal Investigator:** *Empowering STEM Learners: Modernizing Labs and Computing Facilities for Interdisciplinary Impact*. Sponsored by National Science Foundation (NSF), funded amount: \$152,004 (approximately)
- **Co-Principal Investigator:** *S-STEM: Scholarships for Low-Income STEM Students at New Jersey City University*. Submitted to National Science Foundation (NSF) on 03/04/2025, requested amount: \$1,999,926 (approximately). Status: Pending
- **Co-Principal Investigator:** *Spring Topological Dynamical Conference*, 2017. Sponsored by National Science Foundation (NSF), funded amount: \$41000 (approximately)
- **Principal Investigator:** *Computational Thinking at an Urban Minority Serving Institute*, Submitted to NSF in March 2017. Proposal was not funded.

Referred Journal Publications:

1. Avner Peleg, **Debananda Chakraborty**, *Stabilizing optical solitons by frequency-dependent linear gain-loss and the collisional Raman frequency shift*, Physica D (July 2025), 134828

<https://doi.org/10.1016/j.physd.2025.134828>

2. Avner Peleg, **Debananda Chakraborty**, *Stabilizing solitons of the cubic-quintic nonlinear Schrodinger equation by frequency-dependent linear gain-loss and delayed Raman response*, Physica D (2023), 133823

<https://doi.org/10.1016/j.physd.2023.133823>

3. EunSu Lee, **Debananda Chakraborty**, Melanie McDonald, *Predicting oil production sites for planning road infrastructure: Trip generation using SIR epidemic model*, Infrastructure (2021), 6(2), 15

<https://doi.org/10.3390/infrastructures6020015>

4. Avner Peleg, **Debananda Chakraborty**, *Radiation dynamics in fast soliton collisions in the presence of cubic loss*, Physica D (2020), 132397

<https://doi.org/10.1016/j.physd.2020.132397>

5. Avner Peleg, **Debananda Chakraborty**, *Transmission stabilization in soliton-based optical-waveguide systems by frequency-dependent linear gain-loss and the Raman self-frequency shift*, Volume 98 (2018) 013853, Physical Review A,

<https://journals.aps.org/pra/abstract/10.1103/PhysRevA.98.013853>

6. Avner Peleg, **Debananda Chakraborty**, *Large stable oscillations due to Hopf bifurcation in amplitude dynamics of colliding soliton sequences*, Vol. 63, 2018, Communications in Nonlinear Science and Numerical Simulation,

<https://www.sciencedirect.com/science/article/pii/S1007570418300844?via%3Dihub>

7. **Debananda Chakraborty**, Gunhan Caglayan, *Semiregular tessellations with pattern blocks*, Mathematics Lens Department, Vol 111 (2), October 2017

https://www.jstor.org/stable/10.5951/mathteacher.111.2.0090?seq=1#page_scan_tab_contents

8. **Debananda Chakraborty**, Avner Peleg, Quan M. Nguyen, *Stabilizing soliton-based multichannel transmission with frequency dependent linear gain-loss*, Vol. 371, 2016, Optics Communications,

<http://www.sciencedirect.com/science/article/pii/S0030401816302024>

9. Joshua Buli, Jae-Hun Jung, **Debananda Chakraborty**, *A remark on the multi-domain hybrid method for calculating the power-law decay of the gravitational radiation waveforms with analytic radiation boundary conditions*, Int. Journal of Applied Nonlinear Science, Vol. 1, No. 2, 2014, <http://www.inderscience.com/info/inarticle.php?artid=61038>

10. **Debananda Chakraborty**, Avner Peleg, Jae-Hun Jung, *Stable long-distance propagation and on-off switching of colliding soliton sequences with dissipative interaction*, Phys. Rev. A, Vol. 88, 023845 (2013),

<http://pra.aps.org/abstract/PRA/v88/i2/e023845>

11. **Debananda Chakraborty**, Jae-Hun Jung, Emmanuel Lorin, *Efficient determination of critical parameters of nonlinear Schrodinger equation with point-like potential using generalized polynomial chaos methods*, Applied Numerical Mathematics, Vol 72, Oct 2013, pp. 115-130,

<http://dx.doi.org/10.1016/j.apnum.2013.05.005>

12. **Debananda Chakraborty**, Jae-Hun Jung, *A quantitative study of the nonlinear Schrodinger equation with singular potential of any derivative orders*, Applied Mathematics Letters, Vol. 26, No. 8, Aug 2013, pp. 860-866,

<http://dx.doi.org/10.1016/j.aml.2013.03.008>

13. **Debananda Chakraborty**, Jae-Hun Jung, *Efficient determination of the critical parameters and the statistical quantities for Klein-Gordon and sine-Gordon equations with a singular potential using generalized polynomial chaos methods*, Journal of Computational Science, Vol. 4, pp. 46–61, Mar 2013,

<http://www.sciencedirect.com/science/article/pii/S1877750312000300>

14. **Debananda Chakraborty**, Jae-Hun Jung, Gaurav Khanna, *A multi-domain hybrid methods for head on collision of black holes in particle limit*, International Journal of Modern Physics C, Vol. 22, No. 5, pp. 517-541, 2011,

<http://www.worldscientific.com/doi/abs/10.1142/S0129183111016415>

Ready for Submission to Peer Reviewed Journal:

1. Avner Peleg, **Debananda Chakraborty**, *Transition to spatiotemporal chaos with multiple colliding pulse sequences of the nonlinear Schrödinger equation*
2. Jae-Hun Jung, **Debananda Chakraborty**, *A spectral approximation of the critical parameters for the discrete energy jump of di-block copolymers*

In Preparation:

1. **Debananda Chakraborty**, Avner Peleg, *Analysis of fast two-pulse collisions in weakly perturbed linear system*
2. **Debananda Chakraborty**, Avner Peleg, *Transmission stabilization in soliton-based optical waveguide systems by frequency dependent linear gain-loss and frequency shifting due to temporal intensity variations*

Research Interest:

Data Science, Artificial Intelligence, Neural Network, Spectral methods, Higher order finite difference methods, Discontinuous Galerkin methods, Uncertainty Quantification, Polynomial Chaos, Partial Differential Equations, Stochastic Methods, Nonlinear Optics, Financial Mathematics, High Performance Computing, Nonlinear Dynamics, Linear and Nonlinear Waves, Pattern Formation, Population Dynamics Models, Waves in random media

Conference Participation:

1. **UBTech Conference**, June 10th -12th, 2019, Orlando, Florida
2. **SIAM Conference on Analysis of Partial Differential Equations**, December 9th - 12th, 2017, Baltimore, Maryland
3. **Transformative Learning Conference**, March 2nd - 3rd, 2017, University of Central Oklahoma, Oklahoma City
4. **Spring Topological and Dynamical Conference**, March 7th - 11th, 2017, New Jersey City University
5. *The Eighth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory*, March 25th - 28th, 2013, University of Georgia, Athens, GA
6. *New York Conference in Applied Mathematics*, Rensselaer Polytechnic Institute, October 13th, 2012, Troy, NY
7. *SIAM Conference on Uncertainty Quantification (UQ12)*, April 2nd - 5th, 2012, Raleigh, North Carolina, USA
8. *Applied Math Days*, Rensselaer Polytechnic Institute, March 30th - 31st, 2012, Troy, NY
9. *AMS Joint Mathematics Meeting*, January 4th – 7th, 2012, Boston, MA
10. *Laurier Centennial Conference: AMMMC-2011*, July 25th – 29th, 2011, Waterloo, Canada
11. *Advances and Challenges in Computational General Relativity*, May 22nd, 2011, Brown University, Providence, RI
12. *New York Conference on Applied Mathematics*, April 30th, 2011, Buffalo, NY

13. *Applied Math Days*, Rensselaer Polytechnic Institute, April 8th – 9th, 2011, Troy, NY
14. *Wave 2011*, April 7th, 2011, Athens, Georgia
15. *Sigma-Xi Poster Presentation*, April 6th, 2011, State University of New York at Buffalo, Buffalo, NY

Invited Talk:

1. *New Academic Leaders*, Scientific Undergraduate Research Institute, October 27th, 2017, New Jersey City University (NJCU)
2. *STEM Career Talk to the Mathematics, Engineering, Technology and Science (METS) Charter's Students*, May 19th, 2017, NJCU
3. *STEM Career Pathways*, Scientific Undergraduate Research Institute, April 28th, 2017, NJCU
4. *Research Symposium*, Scientific Undergraduate Research Institute (SURI), April 11th, 2017, NJCU
5. *Applied Mathematics Seminar*, Jadavpur University, August 8th, 2016, Kolkata, India
6. *Applied Mathematics Seminar*, Haldia Institute of Technology, July 31st, 2015, Haldia, India
7. *Research Symposium*, Scientific Undergraduate Research Institute (SURI), April 14th, 2015, NJCU
8. *Applied Mathematics Seminar*, State University of New York at Buffalo, November 30th, 2011, Buffalo, NY, US

Undergraduate and Graduate Research Mentoring

Summer 2025: Under HSI -STEM Grant

Student 1 and 2: Knowledge Extraction in Digit Recognition Using MNIST Dataset: Evolution in Handwriting Analysis

Student 3: Integrating Technology into Teaching Calculus by Using GeoGebra (Continuation of the research from summer 2020)

Summer 2024: Under HSI -STEM Grant

Student 1 and 2: Singular Value Decomposition and Application to the Image Processing

Student 3: New Numerical Approach for Fractional Differential Equations

Summer 2023: Under HSI -STEM Grant

Student 1: Detecting Diabetes and Breast Cancer Using Machine Learning Models

Student 2: Why the Tacoma Narrows Bridge Collapsed: An Engineering Analysis

Summer 2022: Under HSI -STEM Grant

Student 1: Regularization of Digital Pulses by Removing Gibb's Phenomenon

Student 2: Time Series Analysis and Modeling of Pandemic

Summer 2021: Under HSI -STEM Grant

Student 1: Incorporating Technologies in Mathematics Classroom

Student 2: Covid-19 Data Analysis: Number of Cases, Deaths, and Vaccinations

Summer 2020: Under HSI -STEM Grant

Students 1 and 2: Geogebra in Classroom Applications for Teaching Calculus

Summer 2019: Under HSI -STEM and MSEIP Grant

Students 1 and 2: Application of Fourier series in Digital Signal Processing

Student 3: Heat Distribution on a Cooling Fin

Student 4: An Algorithmic Introduction to Numerical Simulation of Stochastic Differential Equations

Student 5: Singular Value Decomposition and Application to the Image Processing

Student 6: Statistical Analysis of Bitcoin Trading

Summer 2018: Under HSI - STEM and MSEIP Grant

Students 1 and 2: High Order Methods for Solving Nonlinear Systems of Equations: An Application to the Global Positioning System

Student 3: Traffic Flow Modelling: Conceptual Model and Specific Implementations

Summer 2017: Under HSI - STEM and MSEIP Grant

Student 1: Experimental Modeling with High-Order Polynomials

Student 2: An Algorithmic Introduction to Numerical Simulation of Stochastic Differential Equations

Student 3: Nonlinear Differential Equations: Application to Chemical Kinetics

Student 4: Mathematical Modeling of Disease of Outbreak

Fall 2024: Master's Thesis

Student 1: A Framework for Integrating Technology and Evidence-Based Pedagogical Theories into Post-Secondary Mathematics Instruction: Focus on 1st and 2nd-Year Courses

Student 2: A Detailed Study of Solving Various Methods for Lower Degree Polynomial Equations

Spring 2019: Master's Thesis

Student 1: Benefit of Manipulatives in Math Classroom

Spring 2018: Master's Thesis

Student 1: Compare the Effect of Cooperative Learning on Students' Understanding of Solving Word Problems

Spring 2015: Master's Thesis

Student 1: Infinite Products and the Gamma Function

Student 2: Team Teaching

Workshops Participation:

1. *General Education Faculty Development Workshop*, November 17th, 2017, New Jersey City University
2. *Quantitative Literacy across the Curriculum*, March 24th, 2017 and May 5th, 2017, New Jersey City University
3. *Quantitative Literacy across the Curriculum*, September 23rd, 2016 and October 14th, 2016, New Jersey City University
4. *General Education Faculty Development Workshop*, December 2nd, 2016, New Jersey City University
5. *Blackboard for Developmental Math*, Opening the Gate Workshop, April 15th, 2016, New Jersey City University
6. *Campus-Wide Launch of the EAB Student Success Collaborative*, February 2nd, 2016, New Jersey City University
7. *Supplemental Instruction – What Math Faculty Need to Know*, Opening the Gate Workshop, January 15th, 2016, Hudson County Community College
8. *Blackboard and Online Support*, Opening the Gate Workshop, December 4th, 2015, New Jersey City University

9. *Understanding the Trends of New Developmental Math Curriculum at NJCU: Helping Our Students Succeed*, Opening the Gate Workshop, October 30th , 2015, New Jersey City University
10. *Strategies and Resources to Support College Teaching*, Professional Development Workshop, September 25th , 2015, New Jersey City University
11. *Capstone Tire III Course Development Techniques*: May 11th , 2015, New Jersey City University
12. *Using “MyMathLab” in Class*: Opening the Gate Workshop, March 27th, 2015, New Jersey City University

University Service:

Current Member of the Following Committees:

1. Department of Mathematics Curriculum Committee
2. Department of Mathematics Scheduling Committee
3. Department of Mathematics Basic Skills Committee
4. Advisor of Kappa-Mu-Epsilon National Mathematics Honor Society

Served as a Member of the Following Committees:

1. Senate Election Committee
2. Associate Dean of Science Search Committee
3. Chair of Mathematics Department Chair Election Committee
4. Senate Instructional Technology Committee
5. Shared Governance Taskforce
6. Global Village Mentorship Program
7. General Education Committee for Assessment and Policy (GECAP)
8. Department of Mathematics Program Review Committee
9. Scientific Undergraduate Research Institute (SURI) Executive Committee
10. Co-Advisor of Math Club
11. Mentoring Team of Robert Noyce Grant
12. Alternate Senator of the Department of Mathematics
13. Department of Mathematics Assessment Committee
14. Department of Mathematics Statistics Faculty Search Committee

15. Minority Science and Engineering Improvement Program (MSEIP) Grant
16. “High Impact Practice” Team (Spring 2018) as a part of the Grant awarded by American Association of State Colleges and Universities (AASCU)
17. General Education Assessment Team
18. Spring 2017 STEM Fellow Program in Collaboration with SURI
19. Department of Mathematics Math Education Faculty Search Committee

Community Service:

Current Member of the Following Committee:

1. Member of Scientific Review Committee of Jersey City Medical Center and RWJBarnabas Health STEM Showcase

Computer Skills:

1. *Microsoft Certified System Professional* on Windows Client-Server
2. Languages: *C++*, *FORTRAN*, *PYTHON*
3. Mathematical Software Packages: *MATLAB*, *MAPLE*, *MATHEMATICA*, *MINITAB*, *GEOGEBRA*
4. Microsoft Office 365: *MS-WORD*, *EXCEL*, *POWERPOINT*, *MS-ACCESS*
5. Mathematics Teaching: *MyMathLab*, *Web-Assign*, *MathXL*, *Blackboard*

Courses Taught:

New Jersey City University

Discrete Structure II, Linear Algebra, Selected Topics in Linear Algebra, Survey of Modern Math, Complex Variables, Differential Equations for Engineers, Numerical Analysis, Financial Mathematics, Elementary Functions, Mathematical Statistics I, Mathematical Modeling, Calculus and Analytical Geometry I, Calculus for Business, Pre-Calculus for Business, Basic Statistics, Intermediate Algebra

Virginia Intermont College

Intermediate Algebra, Differential Equations, Linear Algebra, Calculus of Single Variables, Calculus of Several Variables, Introduction to Higher Mathematics

References:

1. Dr. Yi Ding

Professor and Co-Chair, Dept. of Mathematics, New Jersey City University

Email: yding@njcu.edu, Phone: 201-200-3283

2. Dr. Beimmnet Teclezghi

Professor and Co-Chair, Dept. of Mathematics, New Jersey City University

Email: btectezghi@njcu.edu, Phone: 201-200-3139

3. Dr. Gunhan Caglayan

Associate Professor, Dept. of Mathematics, New Jersey City University

Email: gcaglayan@njcu.edu, Phone: 201-200-2415