Brian Jongwon Choi

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Nationality: USA

Interests

Harmonic analysis, Numerical analysis, Partial differential equations, Dynamical systems, Uncertainty quantification

Education

Boston University
- PhD, Mathematics, May 2020
- Thesis (under Mark A Kon): *Weighted Fourier Analysis and Dispersive Equations*

Boston College
- B.S., Magna Cum Laude, Mathematics (Major), Physics (Minor), May 2014
- Recipient of the Sally Award 2014 (awarded to the top graduating math major)
- Member of Pi Mu Epsilon (mathematics) and Sigma Pi Sigma (physics)
- Thesis (under Dubi Kelmer):
  An Algebraic Approach to Quantum Systems Using Finite Group Representation

Appointment

United States Military Academy West Point
- Assistant Professor (Department of Mathematical Sciences), Jun 2023-Present
- Deputy Director for Center for Data Science, Jun 2023-Present

Southern Methodist University
- RTG Postdoctoral Fellow (Mentor: Alejandro Aceves), Jan 2021-Jun 2023

Boston University
- Research Assistant, Jun 2020-Dec 2020

Boston College
- Instructor, MATH1004 Finite Probability and Applications, Sept 2020-Dec 2020

Awards/Grants

Faculty Research Funds (competitive internal grant), USMA West Point Mar 2025
Science Policy Fellowship, Society for Industrial and Applied Mathematics 25 - 2026
Faculty Research Funds (competitive internal grant), USMA West Point Apr 2024
PUI Travel Grant to JMM24, American Mathematical Society Jan 2024
Korean Honor Scholarship, Consulate General of Korea in USA Sept 2019
DAAD RISE Scholarship, Paul-Erlich-Institut, Germany May-Aug 2014
Sally Award, Department of Mathematics, Boston College May 2014
Gilman International Scholarship, Institute of International Education May 2012

Publications/ Preprints

Nonexistence of traveling wave solutions in the fractional Rosenau-Hyman equation via homotopy perturbation method (2025) arXiv:2502.07810 (submitted to *Journal of Nonlinear, Complex and Data Science*)

Nonlinear Excitation of Ground States on Nonlocal Lattices (2024) arXiv:2408.11177 (submitted to *Discrete Contin. Dyn. Syst. Ser. B*)

(With Parcell, Starling) Optimizing Performance of Real-time Detection and Classification for Military Personnel and Weapons *The ITEA Journal* (2024), **45**(3), DOI: 10.61278/itea.45.3.1005

Dynamics of periodic fractional discrete nonlinear Schrdinger equation in the continuum limit (2024) arXiv:2401.13152 (submitted to *Applicable Analysis*)

(With Norton, Xu, Kon, Castrillon) Complex Analyticity of the Nonlinear Poisson-Boltzmann Equation For the Interface Problem with Random Domains (2023) arXiv: 2309.16439 (final revision submitted to *Numerische Mathematik*)

(With Marstaller, Aceves) On Localization of the Fractional Discrete Nonlinear Schrödinger Equation (2023) arXiv:2309.11395 (submitted to *Communications in Nonlinear Science and Numerical Simulation*)

(with Walton) Infinite Speed of Propagation of Fractional Dispersive Equations (2023) ArXiv: 2301.06288 (submitted to *Communications on Pure and Applied nalysis*),

(with Aceves) Continuum Limit of 2D Fractional Nonlinear Schrödinger Equation *Journal of Evolution Equations* (2023), **23**(30), p.1-35, https://doi.org/10.1007/s00028-023-00881-3.

(with Aceves) Well-posedness of Mixed Nonlinear Schrödinger Equation *Partial Differential Equations in Applied Mathematics* (2022), **6**(c), p.1-11, 100406, https://doi.org/10.1016/j.padiff.2022.100406.

(with Castrillon, Kon, Norton, Xu) Analytic Regularity of Nonlinear Poisson Boltzmann Equation (2021), arXiv:2106.05811. (final revision submitted to *Computers and Mathematics with Applications*)

Multilinear Weighted Estimates and Quantum Zakharov System, *Mathematical Modelling and Analysis* (2022), **27**(2), 342-359, https://doi.org/10.3846/mma.2022.15555.

Remark on the Adiabatic Limit of Quantum Zakharov System, *Bulletin of the Malaysian Mathematical Sciences Society* (2022), **45**, 17111735, https://doi.org/10.1007/s40840-022-01272-6.

Small Time Behavior and Summability for Schrödinger Equation, *Graduate Journal of Mathematics* (2021), **6**(2), 9-21.

University Teaching	**Academic Semester Teaching**, *United States Military Academy*

Academic Semester Teaching, *United States Military Academy*
- MA487 Real analysis II, MA365 ENG. Math, MA389 Indep. study   Fall 2024
- MA104 Calculus I-II (Combined)   Spring 2024
- MA205 Multivariable calculus   Fall 2023

Academic Semester Teaching, *Southern Methodist University*   Jan21 - May23
- MATH1337,1338,3302 Calculus I-III, respectively
- STAT2331 Introduction to Statistical Methods

Academic Semester Teaching, *Boston College*
- MATH1004 Finite Probability and Applications   Fall 2020

Academic Semester Teaching, *Boston University*
- MA113: Introduction to Statistics   Spring 2020

Summer Instructor, *Boston University*
- MA115,116 Statistics I-II   2015
- MA123 Calculus I   2016
- MA226 Differential Equations   2017

Teaching Fellow (graduate student), *Boston University*   2014-2020
- EK102 Linear Algebra for Engineers
- MA121,122 Calculus I for Social Sciences, Calculus II for Social Sciences
- MA123 Calculus I

- MA226 Differential Equations
- MA411 Advanced Calculus
- MA511 Analysis I
- MA569 Operations Research

Mentorship	**Undergraduate student advising**, (Mentee: *Theodore Grimes*)	AY2025

- USMA: MA389 (Indep. Study): Numerical methods in dynamical systems

Undergraduate student advising, (Mentee: *Karly Parcell*) AY2024

- USMA: MA489-499 (Senior thesis): image classification via CNN/YOLO; paper published in the ITEA journal

PhD student advising, (Mentee: *Austin Marstaller*) AY2023

- Co-advised his PhD dissertation at Southern Methodist University

PhD student advising, (Mentee: *Steven Walton*) AY2022

- Southern Methodist University: paper submitted: *Communications on Pure and Applied nalysis*

Undergraduate student advising, (Mentee: *William Graham*) AY2020

- Directed Reading Program at Boston University: *Stochastic Differential Equations (Evans)*

Talks

Seminar talk, University of Tennessee Chattanooga, TN Apr 2025
"From nonlinear waves to quantum systems:
analysis, uncertainty, and applications"

Seminar talk, Creighton University, NE Feb 2025
"Nonlinear Waves and Quantum Systems: Analysis, Uncertainty, and Beyond"

Seminar talk, Villanova University, PA Jan 2025
"Bridging Nonlinear Waves and Quantum Systems: Analytical Tools, Uncertainty Quantification, and Real-World Modelss"

AMS Eastern Sectional Meeting, Albany, NY Oct 2024
"Kuramoto oscillators with time delay and memory effects"

SIAM Nonlinear Waves and Coherent Structure, Baltimore, MD Jun 2024
"Long-range Interaction on Lattice"

Invited Talk, PDE School (UC Berkeley), Berkeley, CA Jun 2024
"Nonlocal Discrete Solitons"

Poster, ICERM, Providence, RI Apr 2024
"Time Evolution of the mixed-Fractional NLS"

Invited Talk, AMS East Sectional (Howard University) Apr 2024
"Modulational instability and continuum limit of periodic fractional NLS"

Seminar Talk, CUNY Graduate Center Mar 2024
"Nonlocal dispersive lattice dynamics and continuum limit"

Invited Talk, AMS Special Session Mathematical Physics JMM Jan 2024
"On Localization of Fractional Discrete Schrödinger Equation"

Seminar Talk, SUNY New Paltz   Oct 2023
    "Application of Fractional Calculus to Physics Via Differential Equation"

SIAM NNP 2023, New Jersey Institute of Technology (Contributed Talk)   Oct 2023
    "Localization of Discrete Fractional Schrödinger Dynamics"

Great Lakes Mathematical Physics, Oberlin College (Contributed Talk)   Jun 2023
    "Discrete to Continuum Dynamics of Fractional Nonlinear Schrödinger Equation"

SIAM DS 2023, Oregon (Contributed Talk)   May 2023
    "Continuum Limit of 2D Fractional Nonlinear Schrödinger Equation"

12th Ohio River Analysis Meeting (Contributed Talk)   Mar 2023
    "On the Compactness of Solution Support of Fractional Dispersive Equations"

United States Military Academy West Point, New York   Feb 2023
    Teaching Demonstration

Research Talk, Navy Research Lab (Invited by Dr.Dey)   Jan 2023
    "Bifurcation of Discrete Solitons of the Nonlinear Schrödinger Equation"

SIAM 2022 TX-LA, University of Houston   Nov 2022
    "Continuum Limit of 2D Fractional Nonlinear Schrödinger Equation"

Computational Science Seminar, University of Texas at Dallas   Oct 2022
    "Continuum Limit of 2D Fractional Nonlinear Schrödinger Equation"

(Poster) SIAM Analysis of PDE 2022, Berlin, Germany (Virtual)   Mar 2022
    "Dynamics of the Mixed-Fractional Nonlinear Schrdinger Equation"

Hamilton Methods and Asymptotic Dynamics, ICERM   Dec 2021
    "Quantum Zakharov System with the Periodic Boundary Condition"

SIAM 2021 TX-LA, UTRGV (Minisymposium)   Nov 2021
    "On Mixed Nonlinear Schrödinger Equation"

Ohio River Analysis Meeting, University of Kentucky   Mar 2020
    "Periodic Quantum Zakharov System"

AMS Sectional Meeting, Tufts University   Mar 2020
    "Fourth-Order Perturbation of Cubic Nonlinear Schrödinger Equation"

Joint Mathematics Meetings (Contributed Paper Session)   Jan 2020
    "Global Well-posedness and Modified Strichartz Estimates for the Fourth-Order
    Schrödinger Equation"

SIAM Analysis of PDE (at La Quinta)   Dec 2019
    "Global Well-Posedness of the Adiabatic Limit of Quantum Zakharov System in 1D"

BU/Brown/UMASS Dynamics & PDE Seminar   Nov 2019
    "Pointwise convergence of Full Schrödinger Operator"

MSRI: Recent topics on well-posedness and stability of incompressible fluid and related
topics   Jul 2019

"A.E. Pointwise Convergence of Schrödinger Operator to the Identity"

Geometric and Harmonic Analysis, University of Conneticut   Mar 2019
     "Pointwise Convergence of Schroedinger Operator to the Identity"

Boston Graduate Math Colloquium, Boston College   Feb 2018
     "Nonlinear Smoothing in Nonlinear Schrödinger Equation"

BU Student Dynamics Seminar, Boston University

- "Wellposedness theory for the 1-dimensional Adiabatic Limit of Quantum Zakharov System"   Feb 2019
- "Expository Talk: Fourier Restriction"   Nov 2017
- "Difficulties in Extending Onsager's Conjecture to a Bounded Domain"   Feb 2017
- "Time-Frequency Analysis and Carleson's Theorem"   Dec 2016
- "Representation Theory Methods in Quantum Systems"   Nov 2016

Professional Service		
Final judge, Interdisciplinary Contest in Modeling (ICM)	Apr 2025
Article review, Computers & Mathematics With Applications	Feb 2025
PhD defense committee (SMU), Austin Marstaller's PhD defense	Dec 2024
Article review, Computational and Mathematical Biophysics 12(1)	Apr 2024
Bradley Omar Fellowship review, United States Military Academy	Feb 2024
Grant proposal review, Army Research Office	Jan 2024
Research Experience for Undergraduates (REU at SMU),	Jul 2023
Article review, Communications in Contemporary Mathematics 23(4)	2020
Student Dynamical Systems Seminar at Boston University, Organizer	2017-2019

Skills

Machine Learning Specialization (Coursera)
(Stanford University, DeepLearning.AI, Credential Id: Q3JH7TCP34VD),   Aug 2022
Introductory C Programming Specialization (Coursera)
(Duke University, Credential Id: GA6S3L9UMQYH)   Sept 2022

Miscellaneous

Assistant officer-in-charge, Korean American Relations Club, USMA   2024 - 2025
Violin II, Boston University All-campus orchestra   2017 - 2018
Violin II, Boston College Orchestra   2010 - 2011