

Tadanaga Takahashi (He/Him)

CURRICULUM VITAE

Newark, New Jersey

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Education

New Jersey Institute of Technology

Newark, NJ

PHD IN MATHEMATICAL SCIENCES

Sept. 2017 - May 2023

- Advisor: Dr. Yassine Boubendir
- Co-Advisor: Dr. Brittany Hamfeldt
- Dissertation Title: Domain Decomposition Methods for Linear and Nonlinear Elliptic Equations

New Jersey Institute of Technology

Newark, NJ

BS IN MATHEMATICAL SCIENCE

Sept. 2014 - May 2017

- Dual focus in Applied and Computational Mathematics
- Capstone Advisor: Dr. Lou Kondic
- Capstone Project: Using persistent homology to analyze impact on a bed of granular particles

Professional Experience

2023 **Adjunct Professor**, Dept. of Mathematical Sciences, NJIT

2019-2023 **Graduate Research Assistant**, Dept. of Mathematical Sciences, NJIT

2017-2019 **Graduate Teaching Assistant**, Dept. of Mathematical Sciences, NJIT

2016-2017 **Undergraduate Research Assistant**, Dept. of Mathematical Sciences, NJIT

Publications

IN PREPARATION

2023. (with Yassine Boubendir). Non-overlapping Domain Decomposition Method with Crosspoints for the Helmholtz Equation

2023. (with Yassine Boubendir, Brittany Hamfeldt, Jake Brusca). Globalized Local Newton's Method: a Nonlinear Domain Decomposition Method

IN REVIEW

2023. (with Yassine Boubendir, Brittany Hamfeldt, Jake Brusca). Domain Decomposition Method for the Monge Ampère Equation. arXiv. <http://arxiv.org/abs/2306.01677>.

PUBLISHED

2022. (with Yassine Boubendir). Non-Overlapping Domain Decomposition Methods with Cross-Points and Padé Approximants for the Helmholtz Equation. In: *Domain Decomposition Methods in Science and Engineering XXVI*. Ed. by Susanne C. Brenner et al. Vol. 145. Cham: Springer International Publishing.

2019. (with Abram Clark, Trush Majmudar, and Lou Kondic). Granular Response to Impact: Topology of the Force Networks. *Physical Review E* 97.1

Awards, Fellowships, & Grants

2020-2022 **Efficient High Frequency Integral Equations and Iterative Methods**, NSF 1720014

2019-2020 **Ahluwalia Doctoral OAF Fellowship**, NJIT

2018-2019 **Provost Doctorial Award**, NJIT

2017-2018 **Provost Doctorial Award**, NJIT

2016-2017 **Ahluwalia Scholarship for Applied Mathematics**, NJIT

2016-2017 **Thomas Maniscalco Annual Scholarship**, NJIT

2015-2017 **Ahluwalia Scholarship for Applied Mathematics**, NJIT

2014-2017 **NJ STARS**, NJHESSA

Presentations

CONTRIBUTED PRESENTATIONS

2023. (with Yassine Boubendir). Domain Decomposition Methods for Nonhomogeneous Scattering Simulations. Poster presentation at Frontiers in Applied & Computational Mathematics. NJIT, Newark, NJ.
2020. (with Yassine Boubendir). Non-overlapping Domain Decomposition Methods with Cross-Points and Padé Approximants for the Helmholtz Equation. Proceeding for 26th International Domain Decomposition Conference. Hong Kong, China.
2019. Non-overlapping Domain Decomposition Methods for Scattering Problems. Poster presentation at Dana Knox Student Showcase. NJIT, Newark, NJ.
2017. Analyzing Force Networks in Granular Systems using Persistent Homology. Poster presentation at Frontiers in Applied & Computational Mathematics. NJIT, Newark, NJ.
2016. (with Diego Rios, Alina Mohit-Tabatabai). Applications of the Kalman Filter for Modeling Eddy Currents. Poster presentation at IEEE URTC Conference at MIT, Cambridge, MA.

Teaching Experience

- Fall 2023 **Calculus I (MATH 111)**, Adjunct Professor
- Spring 2022 **Precalculus (MATH 110)**, **Calculus (MATH 111)**, Teaching Assistant
- Fall 2019 **Numerical Methods (MATH 340)**, Teaching Assistant
- Spring 2018 **Calculus II (MATH 112)**, **MATLAB Helpdesk**, Teaching Assistant, Tutor
- Fall 2018 **Teaching Mathematics (MATH 599)**, Teaching Assistant
- Spring 2017 **Calculus I (MATH 111)**, **MATLAB Helpdesk**, Teaching Assistant, Tutor
- Fall 2017 **Calculus I (MATH 111)**, **MATLAB Helpdesk**, Teaching Assistant, Tutor

Research Projects

Nonlinear Additive Schwarz for the Monge-Ampère Equation

NJIT

CO-ADVISORS: DR. YASSINE BOUBENDER, DR. BRITTANY HAMFELDT

2020 - 2023

- Model: Monge-Ampère
- Methods: Wide stencil, Newton-Raphson, Domain Decomposition
- Goal: Study convergence of domain decomposition for a fully-nonlinear problem

Crosspoint Algorithm for Nodal Finite Elements DDM with DtN-based Transmission Operators

NJIT

ADVISOR: DR. YASSINE BOUBENDIR

2019-2023

- Model: Nonhomogenous Helmholtz
- Methods: Finite Element, Boundary Element, Domain Decomposition
- Goal: Develop efficient algorithms for wave scattering simulations for mid to high frequencies

Analyzing Force Networks in Granular Systems using Persistent Homology

NJIT

ADVISOR: DR. LOU KONDIC

2016-2018

- Model: Network-based Granular model
- Methods: Persistent homology
- Goal: Analyze the force propagation during impact using computational topology tools

Applications of the Kalman Filter for Modeling Eddy Currents

NJIT

SUPERVISOR: DR. RICHARD MOORE

2015-2016

- Model: Linear stochastic differential equation
- Methods: Kalman Filter
- Goal: Simulate data assimilation problem to predict parameterized system using various observer configuration