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Jackson C. Turner Ph.D. Candidate

Summary

PhD student in Applied Mathematics and Presidential Fellowship recipient at Columbia University. Experienced in the theory, modeling, and computation of dynamical systems, nonlinear waves, Hamiltonian systems, and fluid/plasma flow stability. Advised by Michael I. Weinstein.

Proven ability to produce cutting-edge research and results in an industry setting. Focused on building a strong academic and practical foundation for impactful contributions in the intersection of mathematics, physics, finance, and engineering through collaborative projects.

Education

Columbia University — *New York, NY*
PhD, Applied Mathematics – 3.97 GPA — *Sep 2021 – May 2026 (Expected)*
Columbia University — *New York, NY*
MS, Applied Mathematics – 3.89 GPA — *Feb 2023*
University of Utah — *Salt Lake City, UT*
Honors BS, Applied Mathematics/Physics – 3.95 GPA — *May 2021*

Relevant Skills

Modeling & Dynamical Stability Analysis — *Zap Energy, Summer 2025*
Performed linear-stability / spectral analyses for axisymmetric MHD models. Studied the onset of Kelvin–Helmholtz and Mack-mode instabilities by implementing tools from bifurcation theory and complex analysis.

Numerical Methods & Computing
Developed novel PDE eigenvalue solvers in Python and Matlab for computation in curved geometries. Developed shape optimization solvers in Gurobi and Python. Experienced with continuation methods such as AUTO and Bifurcation.kit. Experienced with simplectic integrators for dynamical systems. Developed robust custom plasma stability diagnostic tools in Julia.

Nonlinear Dynamics & Spectral Theory — *Ph.D. Research, Columbia University*
Studied how scattering resonances and transmission zeros generate nonlinear bound states. Applied variational, spectral, and bifurcation methods to quantum, optical, and plasma models.

Optimization & Variational Methods
Analyzed high-dimensional optimization and stability problems in nonlinear PDEs. Experienced with constrained minimization and Euler–Lagrange analysis.

Leadership & Communication
Outreach Chair, Columbia SIAM (2024–25): organized industry panels and alumni events. Taught weekly English and religious courses (2015–2017); trained volunteers in teaching and Cantonese. Full professional proficiency in Cantonese; limited working proficiency in Mandarin.

Selected Honors & Awards

Presidential Fellowship, Columbia University — *2021–2026*
Best Poster Award, Joint Alabama–Florida Conference — *2025*
Selected Speaker, Univ. of Utah Mathematics Awards Ceremony — *2021*
Presidential, Regents', & Valedictorian Scholarships, Univ. of Utah — *2017–2021*
Eagle Scout Award, Boy Scouts of America — *2010*

Publications

PUBLISHED

Kao, C.-Y., B. Osting & J. C. Turner (2023). *Flat Tori with Large Laplacian Eigenvalues in Dimensions up to Eight. SIAM J. Appl. Algebra Geom.*, 7, 172–193.

Turner, J. C. (2021). *Expansion Method for Eigenvalue Problems: Theories, Algorithms, and Applications*. Honors Thesis, Univ. of Utah.

IN PREPARATION

Turner, J. C. & M. I. Weinstein (2025). *Resonance-induced nonlinear bound states*. Submitted for publication; preprint: `arXiv:2510.19538`.

Turner, J. C. & D. Crews (2025). *Linear Stability Analysis of Ideal Magnetohydrodynamics in Cylindrical Shear Flows*. Manuscript in preparation.

Turner, J. C., E. Cherkaev & D. Wang (2022). *A Generalized Expansion Method for Computing Laplace–Beltrami Eigenfunctions on Manifolds*. Preprint: `arXiv:2210.10982`.

Professional Experience

Columbia University, APAM Dept. — *New York, NY*
Graduate Research Assistant, Teaching Assistant — *May 2022 – Present*

Zap Energy, Theory & Modeling — *Everett, WA*
Research Intern — *June – Aug 2025*

CoinZoom, Inc. — *Holladay, UT*
Cryptocurrency Analyst — *May 2020 – Aug 2021*

University of Utah, Dept. of Mathematics — *Salt Lake City, UT*
Research Assistant, Grader, Tutor — *Sep 2019 – May 2021*

The Church of Jesus Christ of Latter-day Saints — *Hong Kong*
Full-time Volunteer — *Aug 2015 – Aug 2017*

Selected Presentations

SELECTED TALKS

Simons Collaboration on Extreme Wave Phenomena — Invited Talk — *Oct 2025*
Scattering Resonances and Nonlinear Bound States.

Department of Mathematics Awards Ceremony, University of Utah — *April 2021*
Generalized Expansion Method: Theory, Computation, and Application

SIAM Northern States Sections Student Chapters Conference, Utah State University — *Oct 2020*
Computation of Eigenfunctions on Manifolds.

Young Mathematicians Conference, Ohio State University — *Aug 2020*
A Fictitious Domain Spectral Method.

SELECTED POSTERS

Simons Collaboration on Extreme Wave Phenomena Annual Meeting — *Oct 2025*
Scattering Resonances and Nonlinear Bound States.

Joint Alabama–Florida Conference on Differential Equations and Dynamical Systems — *May 2025*
Scattering Resonances and Nonlinear Bound States.

Teaching Experience

APMA 2001 Multivariable Calculus — *Lab Instructor & Teaching Assistant* — *Spring 2025*

APMA 6301 Analytic Methods for PDEs — *Teaching Assistant* — *Fall 2024*

APMA 3900 Undergraduate Research — *Directed Reading Supervisor* — *Fall 2023*

APMA 4150 Applied Functional Analysis — *Teaching Assistant* — *Spring 2023*

Other

Competitive tennis player (2x HS State Champion), undefeated in Columbia intramural basketball, avid skier, NBA fan, forklift operator, music enthusiast, StarCraft II player, and people person.