Benjamin A. Hyatt

NSF Graduate Research Fellow and PhD Candidate in Applied Mathematics

Curriculum Vitae

CONTACT

Primary address: 1800 Sherman Avenue, Evanston, IL 60201,
Center for Interdisciplinary Exploration and Research in Astrophysics (CIERA)

Secondary address: 2145 Sheridan Road, Evanston, IL 60208
Department of Engineering Sciences and Applied Mathematics

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EDUCATION

Northwestern University
Ph.D. in Engineering Sciences and Applied Mathematics Expected Spring 2026
Member of Center for Interdisciplinary Exploration and Research in Astrophysics
Advised by Prof. Daniel Lecoanet

Northwestern University
M.S. in Engineering Sciences and Applied Mathematics, 3.96 GPA 2022

University of Maryland, Baltimore County (UMBC)
B.S. in Mathematics, Minor in Physics, Minor in Philosophy, 4.00 GPA 2021
Advised by Prof. Muruhan Rathinam

WORK EXPERIENCE

Lawrence Livermore National Laboratory, Livermore, CA 2024
Computing Graduate Student Intern in Center for Applied Scientific Computing
Mentored by Dr. Christopher Vogl

Johns Hopkins University, Applied Physics Laboratory, Laurel, MD 2016 - 2019
Technical Staff (2018-2019)
NASA Intern (2017, 2018)
ASPIRE Intern (2016-2017)
Mentored by Dr. Carolyn Ernst

RESEARCH INTERESTS

Scientific computing: partial differential equations, numerical analysis, time integration, spectral methods, the *Dedalus* pseudospectral code, high-performance computing
Geophysical and astrophysical fluid dynamics: turbulence and convection, rotating flows, atmospheric models, Earth's climate, dynamics of planetary atmospheres and stellar interiors

HONORS AND FELLOWSHIPS

NSF Graduate Research Fellowship 2023 - 2025
Outstanding Teaching Assistant Award, ESAM Department 2022 - 2023
Walter P. Murphy Fellowship, Northwestern University 2021 - 2022
Outstanding Graduating Senior in Mathematics, UMBC 2021

Freeman A. Hrabowski President's Advisory Council Scholarship, UMBC 2020
Undergraduate Research Award, UMBC 2019 - 2020
Undergraduate Merit Scholarship, UMBC 2017 - 2021

PUBLICATIONS

Benjamin A. Hyatt, Daniel Lecoanet, Evan H. Anders, Keaton J. Burns, Multiple scales analysis of a nonlinear timestepping instability in simulations of solitons, Journal of Computational Physics 531, 113923 (2025). https://doi.org/10.1016/j.jcp.2025.113923.

Anders, E.H., Lecoanet, D., Cantiello, M. et al. incl. **Hyatt, B.A.** The photometric variability of massive stars due to gravity waves excited by core convection. Nat Astron 7, 1228–1234 (2023). https://doi.org/10.1038/s41550-023-02040-7.

Ernst, C.M., Daly, R.T., Gaskell, R.W. et al. incl. **Hyatt, B.A.** High-resolution shape models of Phobos and Deimos from stereophotoclinometry. Earth Planets Space 75, 103 (2023). https://doi.org/10.1186/s40623-023-01814-7.

Ballouz, RL., Ernst, C.M., Barnouin, O.S. et al. incl. **Hyatt, B.A.** Seismic resurfacing of 433 Eros indicative of a highly dissipative interior for large near-Earth asteroids. Nat Astron 9, 347–357 (2025). https://doi.org/10.1038/s41550-024-02411-8.

Hyatt B., Shen. J. Stability Analysis of Model Predictive Control-Based Car-Following Control Under Linear Vehicle Dynamics. UMBC Review 22, 161-189 (2021).

Sheth S, Barnard E., **Hyatt B.**, Rathinam M. and Zustiak S.P. Predicting Drug Release From Degradable Hydrogels Using Fluorescence Correlation Spectroscopy and Mathematical Modeling. Front. Bioeng. Biotechnol. 7, 410 (2019). https://doi.org/10.3389/fbioe.2019.00410.

PRESENTATIONS

(Upcoming) Contributed Talk, AGU25 Annual Meeting 2025
"Polar vortex formation in differentially-rotating 2D disk turbulence"

(Upcoming) Contributed Talk, 78th APS Division of Fluid Dynamics Annual Meeting 2025
"Polar vortex formation in differentially-rotating 2D disk turbulence"

Invited Talk, SIAM Journal Club, Northwestern University 2025
"Polar vortex formation and differential rotation"

Contributed Poster, AGU24 Annual Meeting 2024
"Error Analysis of Single and Multi-rate Temporal Coupling Approaches in a Simplified Aerosol System"

Invited Talk, SIAM Journal Club, Northwestern University 2024
"Process coupling strategies in a simplified aerosol model"

Invited Talk, PAESCAL SciDAC group meeting 2024
"Process coupling strategies in a simplified aerosol model"

Contributed Poster, LLNL Summer SLAM 2024
"Error Analysis of Single and Multi-rate Temporal Coupling Approaches in a Simplified Aerosol Model"

Contributed Talk, 76th APS Division of Fluid Dynamics Annual Meeting 2023
"Timestepping stability in pseudospectral methods"

Contributed Talk, 75th APS Division of Fluid Dynamics Annual Meeting 2022
"Relaxing timestep restrictions for numerical stability in DNS"

Contributed Talk, UMBC SURF 2020
"Stability Analysis of Car-Following Control of Linear Vehicle Dynamics with General MPC Horizon"

Contributed Poster, UMBC URCAD 2020
"A Reaction-Diffusion PDE Model for Predicting Solute Release"

Contributed Talks, APL NASA Intern Presentations 2017, 2018
"Examining the Geologies and Shapes of Small Bodies"

TEACHING EXPERIENCE

Graduate Teaching Assistantship Northwestern University 2022 – 2023

GEN_ENG 206-4 Honors Engineering Analysis 4 (Spring 2023)
ES_APPM 252–1,2 Honors Multivariable Calculus (Fall 2022, Winter 2023)

Teaching Assistant UMBC 2019 – 2021

MATH 225 Differential Equations (Fall 2020, Spring 2021)
PHYS 224 Vibrations and Waves (Spring 2020)
PHYS 324 Modern Physics (Fall 2019)

SERVICE AND MENTORSHIP

Member, Climate Action Team 2022 – 2024

· Served on a team of CIERA (Northwestern) members as a graduate student representative
· Collaborated with a third-party organization Visceral Change to conduct a workplace DEI climate survey, analyze results, and discuss the results with the community in town halls
· Led the production of a final report of survey results and recommended actions including: drafting a code of conduct, establishing a social activity fund and an organizing for CIERA social events, and committing to regular town halls for transparent discussions between community and leadership

Mentor, Causeway Postbaccalaureate Program 2023 – 2024

· Mentored a post-baccalaureate student at Northwestern for three academic quarters, preparing the student to begin doctoral studies in applied mathematics at Purdue University

Mentor, REACH Program Mentor 2023

· Mentored a local Evanston high school student in CIERA (Northwestern) during the summer on a project involving stars, asteroseismology, data sonification (as a creative method for interpretation and analysis), and programming in Python

First-year Foundations Workshop 2022, 2023, 2025

· Introduced incoming first-year PhD students to the Department of Engineering Sciences and Applied Mathematics (Northwestern): gave presentations at beginning of academic year, developed and gave preliminary exam review sessions on multivariable/vector calculus