
Benjamin A. Hyatt

NSF Graduate Research Fellow and PhD Candidate in Applied Mathematics
Curriculum Vitae

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EDUCATION

Ph.D. in Engineering Sciences and Applied Mathematics <i>Northwestern University</i> Advised by Prof. Daniel Lecoanet	2021–Expected 2026
M.S. in Engineering Sciences and Applied Mathematics <i>Northwestern University</i> 3.96 GPA	2021–2022
B.S. in Mathematics , Minor in Physics, Minor in Philosophy <i>University of Maryland, Baltimore County (UMBC)</i> Advised by Prof. Muruhan Rathinam 4.00 GPA	2017–2021

RESEARCH AND PROFESSIONAL EXPERIENCE

NSF Graduate Research Fellow <i>Northwestern University</i>	2023–2026
Graduate Research Intern <i>Lawrence Livermore National Laboratory: Center for Applied Scientific Computing</i> Mentored by Dr. Chris Vogl	Summer 2024
Graduate Teaching Assistantship <i>Northwestern University</i>	2022–2023
Undergraduate Research Assistant <i>University of Maryland, Baltimore County (UMBC)</i> Mentored by Prof. Jinglai Shen	Summer 2019
Research Assistant	2018–2019
NASA Intern	Summer 2017, Summer 2018
ASPIRE Intern <i>Johns Hopkins University, Applied Physics Laboratory: Space Exploration Sector</i> Mentored by Dr. Carolyn Ernst	2016–2017

HONORS AND FELLOWSHIPS

NSF Graduate Research Fellowship	2023–2026
Outstanding Teaching Assistant Award, ESAM Department	2022–2023
Walter P. Murphy Fellowship, Northwestern University	2021–2022
Outstanding Graduating Senior in Mathematics, UMBC	2021
Summa Cum Laude, UMBC	2021
Freeman A. Hrabowski President's Advisory Council Scholarship, UMBC	2020
Undergraduate Research Award, UMBC	2019–2020
Undergraduate Merit Scholarship, UMBC	2017–2021

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: planetary atmospheres, Earth's climate, stellar interiors, turbulence and convection, rotating flows

PUBLICATIONS

Hyatt, B.A., Lecoanet, D., Anders, E.H., Burns, K.J., Multiple scales analysis of a nonlinear timestepping instability in simulations of solitons, *Journal of Computational Physics* 513, 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, R.L., 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 “Polar vortex formation in differentially-rotating 2D disk turbulence”	2025
(Upcoming) Contributed Talk, 78th APS Division of Fluid Dynamics Annual Meeting “Polar vortex formation in differentially-rotating 2D disk turbulence”	2025
Invited Talk, SIAM Journal Club, Northwestern University “Polar vortex formation and differential rotation”	2025
Contributed Poster, AGU24 Annual Meeting “Error Analysis of Single and Multi-rate Temporal Coupling Approaches in a Simplified Aerosol System”	2024
Invited Talk, SIAM Journal Club, Northwestern University “Process coupling strategies in a simplified aerosol model”	2024
Invited Talk, PAESCAL SciDAC group meeting “Process coupling strategies in a simplified aerosol model”	2024
Contributed Poster, LLNL Summer SLAM “Error Analysis of Single and Multi-rate Temporal Coupling Approaches in a Simplified Aerosol Model”	2024

Contributed Talk, 76th APS Division of Fluid Dynamics Annual Meeting “Timestepping stability in pseudospectral methods”	2023
Contributed Talk, 75th APS Division of Fluid Dynamics Annual Meeting “Relaxing timestep restrictions for numerical stability in DNS”	2022
Contributed Talk, UMBC SURF “Stability Analysis of Car-Following Control of Linear Vehicle Dynamics with General MPC Horizon”	2020
Contributed Poster, UMBC URCAD “A Reaction-Diffusion PDE Model for Predicting Solute Release”	2020
Contributed Talks, APL NASA Intern Presentations “Examining the Geologies and Shapes of Small Bodies”	2017, 2018

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
<ul style="list-style-type: none"> · 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
<ul style="list-style-type: none"> · 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
<ul style="list-style-type: none"> · 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 	
Volunteer, First-year Foundations Workshop	Fall 2022, Fall 2023, Fall 2025
<ul style="list-style-type: none"> · 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 	