

# Alejandro N. Diaz

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## EDUCATION

**Rice University** - Houston, TX  
Ph.D., Computational and Applied Mathematics, May 2024 (expected)  
M.A., Computational and Applied Mathematics, May 2022  
Advisor: Prof. Matthias Heinkenschloss, GPA: 3.98

**University of Maryland, College Park** - College Park, MD  
B.S., Mathematics with Departmental Honors, Minor Physics, May 2019, GPA 3.83

## RESEARCH AND WORK EXPERIENCE

**Rice University**, Department of Computational and Applied Mathematics,  
2020-present. *Reduced order models with domain decomposition*.  
Advisor: Prof. Matthias Heinkenschloss

**Microsoft**, Data Science Internship,  
Summer 2023. *Applications of differential privacy to business needs*.

**Lawrence Livermore National Laboratory**,  
Defense Science and Technology Internship - Graduate Summer Student,  
Summer 2022.  
*Domain-decomposition nonlinear reduced order model with shallow masked autoencoder*.  
Advisor: Dr. Youngsoo Choi

**University of California, Los Angeles**, UCLA Applied Mathematics REU,  
Summer 2018. *Data-driven approach for microfluidic device design*.  
Advisors: Prof. Marcus Roper, Dr. Hangjie Ji

**Williams College**, SMALL NSF REU,  
Summer 2017. *Tetrahedral tilings, isoperimetric surfaces in spaces with density*.  
Advisor: Prof. Frank Morgan

**University of Maryland, College Park**, Summer Student Theoretical Physics Research Session, Summer 2016. *Tensor computations in supersymmetry*.  
Advisor: Prof. S. James Gates Jr.

**PUBLICATIONS** Diaz, A. N. Choi, Y. Heinkenschloss, M. *A fast and accurate domain-decomposition nonlinear manifold reduced order model*. arXiv preprint arXiv:2305.15163 (2023).

Diaz, A. N. Gosea I. V. Heinkenschloss, M. Antoulas, A. C *Interpolation-based model reduction of quadratic-bilinear dynamical systems with quadratic-bilinear outputs*. Submitted to ACOM Topical Collection on Model Reduction and Surrogate Modeling (MORe) (2023).

Diaz, A. N. Heinkenschloss, M. *Towards Data-Driven Model Reduction of the Navier-Stokes Equations using the Loewner Framework*. Active Flow and Combustion Control 2021, Notes on Numerical Fluid Mechanics and Multidisciplinary Design, vol 152. Springer, Cham. [https://doi.org/10.1007/978-3-030-90727-3\\_14](https://doi.org/10.1007/978-3-030-90727-3_14)

Bongiovanni, E. Diaz, A. N. Kakkar, A. et al. *The Least-Area Tetrahedral Tile of Space*. Geom Dedicata 205, 51–93 (2020). <https://doi.org/10.1007/s10711-019-00465-x>

Bongiovanni, E. Diaz, A. N. Kakkar, A. Sothanaphan, N. *Isoperimetry in Surfaces*

*of Revolution with Density*. Missouri J. Math. Sci. 30 (2018), no. 2, 150–165. <https://doi.org/10.35834/mjms/1544151692>

Bongiovanni, E. Di Giosia, L. Diaz, A. N. et al. (2018). *Double Bubbles on the Real Line with Log-Convex Density*. Analysis and Geometry in Metric Spaces, 6(1), pp. 64–88. <https://doi.org/10.1515/agms-2018-0004>

Caldwell W. Diaz A. N. Friend I. et al. *On the Four Dimensional Holonomy of the 4D, N=1 Complex Linear Supermultiplet*, International Journal of Modern Physics A 33 (2018), 1850072. <https://doi.org/10.1142/S0217751X18500720>

## TALKS AND PRESENTATIONS

Diaz A., *Impact of the Convergence of Series Expansions on Model Reduction of Quadratic-Bilinear Systems*. Presentation, 2022 Model Reduction and Surrogate Modeling Conference, 21 Sept. 2022, Berlin, Germany.

Diaz A. *Data-Driven Model Reduction using the Loewner Framework*. Poster, 2021 Oil and Gas HPC Conference, 5 Mar. 2021, Houston, TX (virtual).

Diaz A. *Data-Driven Model Reduction using the Loewner Framework*. Presentation, Model Order Reduction for Large-Scale Problems Minisymposium, SIAM Conference on Computational Science and Engineering, 4 Mar. 2021, Fort Worth, TX (virtual).

Diaz A., Kakkar A. *The Least-Area Tetrahedral Tile of Space*. Poster, MAA Undergraduate Student Poster Session, Joint Mathematics Meetings, 12 Jan. 2018, San Diego, CA.

Diaz A. *Existence and Boundedness of Isoperimetric Regions in Surfaces of Revolution with Density*, Informal Geometric Analysis Seminar, 14 Nov. 2017, Math Department, University of Maryland, College Park. Seminar.

Diaz A. *The Log-Convex Density Conjecture in Hyperbolic Space*. MAA Student Paper Sessions, MathFest. 28 Jul. 2017, Hilton Hotel, Chicago, IL. Student Presentation.

## AWARDS

**Global Young Scientists Summit 2022 Attendee**, Oct. 2021

**National Defense Science and Engineering Graduate Fellowship**, Mar. 2021, Sponsoring Agency: Air Force Research Laboratory.

**NSF Graduate Research Fellowship Program Honorable Mention**, Mar. 2021.

**K2I 2020/21 BP Graduate Fellowship**, Rice University, Dec. 2020.

**K2I Computational Science and Engineering Fellowship**, Rice University, May 2019.

**Departmental Honors**, Department of Mathematics, University of Maryland, College Park, May 2019.

**Strauss Teaching Assistantship**, Department of Mathematics, University of Maryland, College Park, Fall 2018 – Spring 2019.

**University Honors Citation**, University of Maryland, College Park, Apr. 2018.

**Outstanding Poster**, Joint Mathematics Meeting, Jan. 2018.

**Banneker-Key Scholarship**, University of Maryland, College Park, May 2015.

**SERVICE**

**SIAM Student Chapter**, Rice University,  
GSA Representative Aug. 2021 - Aug. 2022  
Treasurer, Aug. 2020 - Aug. 2021

**Graduate Student Mentor**, Department of Computational and Applied Mathematics,  
Rice University, Aug 2021 - Present

**Graduate Student Advisory Committee**, Rice University, Member, Aug. 2020 -  
Present

**Freshmen Math Mentorship Program**, Rice University, Graduate Student Mentor,  
Aug. 2020 - Dec. 2020

**TEACHING**

**Rice University**, Department of Computational and Applied Mathematics  
Grader, CAAM 336, Fall 2019, Spring 2020  
Grader, CAAM 453/550, Fall 2020  
Grader, CAAM 554, Spring 2021

**University of Maryland, College Park**, Department of Mathematics  
Teaching assistant, Calculus II, Spring 2019  
Teaching assistant, Calculus I, Fall 2018

**COMPUTER  
SKILLS**

**Programming languages:** MATLAB, Python,  $\text{\LaTeX}$ , C/C++, Mathematica