Manuel A. Santana

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EDUCATION

PhD. Applied and Computational Mathematics — June 2027 (expected)
California Institute of Technology, Pasadena California

B.S. Computational Mathematics, Computer Science Minor — May 2022
Utah State University, Logan, Utah — 3.90 Cum. GPA

Research Interests

I am broadly interested in developing scalable PDE solvers for complex geometries, especially for wave equations. I am currently working on integral equation methods for finding resonances and scattering poles for the Helmholtz and Maxwell equations.

Research Articles

Preprints

Bruno O. P., **Santana M. A.**, Trefethen L. N., 2024 *Evaluation of Resonances via AAA Rational Approximation of Randomly Scalarized Boundary Integral Resolvents* arXiv:2405.19582

Published Articles

Brauer A, Krawick M, and **Santana M.** 2020. Numerical Analysis of the 1-D Parabolic Optimal Transport Problem, *SIAM SIURO*, *Vol 14*:150-166

Beasley L, Brown D, Mousley J, and **Santana M.** 2023 Cordiality of Digraphs, *Journal of Algebra Combinatorics Discrete Structures and Applications, Vol* 10, Issue 1, pp.1-13

Huynh M, **Santana M.** 2021. Alternating Minimization for Computed Tomography with Unknown Geometry Parameters, *SIAM SIURO, Vol 15:62-76,* 2022 DOI:10.1137/21S1441638

Journal Articles

Santana, M., Mousley, J., Brown, D., Beasley, L.B. (2024). (2, 3)-Cordial Trees and Paths. In: Hoffman, F., Holliday, S., Rosen, Z., Shahrokhi, F., Wierman, J. (eds) Combinatorics, Graph Theory and Computing. SEICCGTC 2021. Springer Proceedings in Mathematics & Statistics, vol 448. Springer, Cham. https://doi.org/10.1007/978-3-031-52969-6_12

Mousley, J.M., Beasley, L.B., **Santana, M.** Brown, D.E. (2024). (2, 3)-Cordial Oriented Hypercubes. In: Hoffman, F., Holliday, S., Rosen, Z., Shahrokhi, F., Wierman, J. (eds) Combinatorics, Graph Theory and

Computing. SEICCGTC 2021. Springer Proceedings in Mathematics & Statistics, vol 448. Springer, Cham. https://doi.org/10.1007/978-3-031-52969-6_13

Technical Skills

- Python including Numpy, Pandas, Pytorch
- Matlab including parallel computing toolbox, optimization toolbox, and image processing toolbox.
- C/C++
- Git
- Latex

Professional Experience

SULI Intern June 2022- August 2022

National Renewable Energy Laboratory (NREL)

- I implemented code in python to train several transformer models experimental battery again data in an effort to predict battery lifetime performance.

Teaching Experience

Teaching Assistant August 2023 – Current

California Institute of Technology

- Hold weekly office hours and grade course material.

Linear Algebra Recitation Leader August 2020 – August 2021

Utah State University, Logan, Utah

- Teach four recitations for an introductory Linear Algebra course weekly.
- Assist students in office hours with understanding course material.

Awards

Goldwater Scholar March 2021
NSF Graduate Research Fellowship April 2022
Undergraduate Researcher of the Year - College of Science, Utah State University 2021
Undergraduate Researcher of the Year - Math Department, Utah State University 2021
Hispanic Scholarship Fund Scholar May 2020
Utah State University Presidential Scholar August 2016

Clubs and Organizations

Utah State Science Council – Undergraduate Research VP August 2021 – Current

- Promoted undergraduate research on campus by organizing a research presentation competition, and an REU application workshop night.

College of Science Peer Mentorship Program - Mentor August 2021 – Current

- Met weekly with a freshman student to offer help with knowing what classes to take, developing good study habits, and obtaining a research position.