

# Justin Dong

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🐙 GitHub

🌐 LinkedIn

🌐 <http://jdongg.github.io/>



## Research Interests

physics-informed machine learning, high-order finite element methods, computational fluid dynamics, computational Earth system modeling

## Professional Experience

- 2023 – Present     📌 **Lawrence Livermore National Laboratory**, Livermore, CA, USA.  
Postdoctoral Research Scholar @ *Center for Applied Scientific Computing*
- 2022     📌 **Pacific Northwest National Laboratory**, Richland, WA, USA.  
Research Intern @ *Advanced Computing, Mathematics, and Data Division*
- 2019 – 2023     📌 **Brown University**, Providence, RI, USA.  
Graduate Research Assistant @ *Division of Applied Mathematics*



## Education

- 2023     📌 **Brown University**, Providence, RI, USA.  
*Ph.D., Applied Mathematics* (+*Sc.M., Applied Mathematics*, 2019)  
Dissertation: *Galerkin neural networks for the approximation of partial differential equations with error control*.  
Advisor: Prof. Mark Ainsworth
- 2014     📌 **Rice University**, Houston, TX, USA.  
*B.A., Computational & Applied Mathematics*  
*BSME, Mechanical Engineering*

## Research Publications & Presentations

### Journal Articles


- 1     **J. Dong**, S. B. Roberts, S. P. Santos, C. S. Woodward, and C. J. Vogl, “High-order time integration methods for cloud microphysics,” *In preparation*, 2025.
- 2     M. Ainsworth and **J. Dong**, “Extended galerkin neural network approximation of singular variational problems with error control,” *arXiv preprint arXiv:2405.00815*, 2024. 🔗 DOI: 10.48550/arXiv.2405.00815.
- 3     **J. Dong**, M. A. Brunke, X. Zeng, C. S. Woodward, C. J. Vogl, and H. Wan, “Existence and uniqueness in ocean-atmosphere turbulent flux algorithms in e3sm,” *Authorea Preprints*, 2024. 🔗 DOI: 10.22541/essoar.173430267.76841579/v1.
- 4     A. A. Howard, **J. Dong**, R. Patel, M. D’Elia, M. R. Maxey, and P. Stinis, “Machine learning methods for particle stress development in suspension poiseuille flows,” *Rheologica Acta*, vol. 62, no. 10, pp. 507–534, 2023. 🔗 DOI: 10.1007/s00397-023-01413-z.
- 5     M. Ainsworth and **J. Dong**, “Galerkin neural network approximation of singularly-perturbed elliptic systems,” *Computer Methods in Applied Mechanics and Engineering*, vol. 402, p. 115 169, 2022. 🔗 DOI: 10.1016/j.cma.2022.115169.

- 6 M. Ainsworth and **J. Dong**, “Galerkin neural networks: A framework for approximating variational equations with error control,” *SIAM Journal on Scientific Computing*, vol. 43, no. 4, A2474–A2501, 2021.  DOI: 10.1137/20M1366587.
- 7 **J. Dong** and B. Rivière, “A semi-implicit method for incompressible three-phase flow in porous media,” *Computational Geosciences*, vol. 20, pp. 1169–1184, 2016.  DOI: 10.1007/s10596-016-9583-2.




## Conference Presentations

- 1 **J. Dong**, M. A. Brunke, X. Zeng, C. S. Woodward, C. J. Vogl, and H. Wan, “Well-posedness of ocean-atmosphere turbulent flux formulations in global climate models,” Joint Mathematics Meeting, 2025.
- 2 M. Ainsworth and **J. Dong**, “Extended galerkin neural networks for approximating singular variational problems,” SIAM Annual Meeting, 2024.
- 3 **J. Dong**, “Galerkin neural networks for approximating partial differential equations,” Focused research group seminar on Variationally Stable Neural Networks at UT Austin, University of South Carolina, Georgia Tech, and Portland State University, 2024.
- 4 **J. Dong**, M. A. Brunke, X. Zeng, C. S. Woodward, and C. J. Vogl, “Existence and uniqueness in ocean-atmosphere coupling in global climate models,” Copper Mountain Conference on Iterative Methods, 2024.
- 5 **J. Dong**, M. A. Brunke, X. Zeng, C. S. Woodward, C. J. Vogl, and H. Wan, “Existence and uniqueness in ocean-atmosphere coupling in global climate models,” SIAM Mathematics of Planet Earth, 2024.
- 6 **J. Dong**, M. A. Brunke, X. Zeng, C. S. Woodward, C. J. Vogl, and H. Wan, “Existence and uniqueness in ocean-atmosphere turbulent flux algorithms in e3sm,” American Geophysical Union Annual Meeting, 2024.
- 7 M. Ainsworth and **J. Dong**, “Galerkin neural network approximation of multiscale problems,” SIAM Annual Meeting, 2022.
- 8 M. Ainsworth and **J. Dong**, “Galerkin neural networks: A framework for approximating partial differential equations with error control,” SIAM Annual Meeting, 2021.
- 9 **J. Dong** and M. Ainsworth, “Galerkin neural networks: A framework for approximating partial differential equations with error control,” Taiwan Semiconductor Manufacturing Company (TSMC) Scientific Computing Seminar, 2021.

## Honors & Awards

2018  NSF Graduate Research Fellowship

## Skills


Languages  C, C++, Fortran, Python, MATLAB  
 API/Library  OpenMP, CUDA, MPI, Tensorflow, Jax  
 Typesetting  L<sup>A</sup>T<sub>E</sub>X

## Outreach & Service



### Professional Service

Referee  SIAM Journal on Scientific Computing (SISC), Journal of Computational Physics

## Outreach & Service (continued)

Organizer     Minisymposium on *Recent advances in approximation theory of neural networks* @ SIAM Computational Science and Engineering 2025

### Outreach

- 2018-2022     **Founder and Organizer, Directed Reading Program.** Brown University  
*I founded the Division of Applied Mathematics's Directed Reading Program which pairs undergraduates with graduate student mentors to work on independent study projects.*
- 2018-2020     **Organizer, Applied Math Graduate/Undergraduate Mentorship Program,** Brown University  
*I organized a mentoring program for undergraduates in the applied math concentration which pairs them with graduate students to learn about career opportunities and graduate school.*

### Professional Memberships




Society for Industrial and Applied Mathematics (SIAM)

American Geophysical Union (AGU)

## Mentoring

- 2024     **Arshia Singhal**, Graduate Student Intern @ Lawrence Livermore National Laboratory  
Arshia received a Top Presenter award at the LLNL Computing Summer Poster Symposium.
- 2020     **Sam Chowning**, Undergraduate Student @ Brown University  
Supervised an independent reading project on the singular value decomposition and its applications.
-  **Arturo Ortiz San Miguel**, Undergraduate Student @ Brown University  
Supervised an independent reading project on the singular value decomposition and its applications.
- 2019     **Emily Reed**, Undergraduate Student @ Brown University  
Supervised an independent reading project on deep learning.
-  **Daniel Masotti**, Undergraduate Student @ Brown University  
Supervised an independent reading project on preconditioned Krylov subspace methods.
- 2018     **Simran Nayak**, Undergraduate Student @ Brown University  
Supervised an independent reading project on adaptive finite element methods.

## Teaching Experience

- 2021     **Brown University Pre-College**, Instructor  
I designed and taught the course *Artificial Intelligence: Modeling Human Intelligence with Networks* for Brown University's Pre-College.
- 2020     **Summer@ICERM**, Teaching Assistant  
I mentored several groups of students on research projects in deep learning, numerical linear algebra, and finite element methods as part of the Summer@ICERM program on *Fast Learning Algorithms for Numerical Computation and Data Analysis*.
- 2019     **Brown University**, Head Teaching Assistant  
Spring 2019: Methods of Applied Mathematics II  
Fall 2018: Methods of Applied Mathematics I

# References

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Available on Request