

## Academic & Professional Experience

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| June 2023 – Present   | 📌 <b>Sidney Fernbach Postdoctoral Fellow</b><br>Lawrence Livermore National Lab, <i>Center for Applied Scientific Computing</i> |
| May 2023 – Aug. 2023  | 📌 <b>Visiting Scholar</b><br>Princeton University, <i>Department of Mechanical and Aerospace Engineering</i>                    |
| April 2023 – May 2023 | 📌 <b>Visiting Researcher</b><br>NASA Ames Research Center, <i>Aerothermodynamics Branch</i>                                     |
| June 2020 – May 2023  | 📌 <b>Computing Scholar Intern</b><br>Lawrence Livermore National Lab, <i>Center for Applied Scientific Computing</i>            |
| May 2017 – Sep. 2017  | 📌 <b>Computational Aerodynamicist Intern</b><br>Haas Formula One Team   |

## Education

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| Aug. 2019 – May 2023  | 📌 <b>Texas A&amp;M University</b><br>Ph.D. Ocean Engineering                                   |
| Aug. 2018 – July 2019 | 📌 <b>Georgia Institute of Technology</b><br>M.Sc. Aerospace Engineering                        |
| Sep. 2014 – May 2018  | 📌 <b>Princeton University</b><br>B.S.E. Mechanical and Aerospace Engineering, <i>cum laude</i> |

## Publications

### Journal Articles

15. PyFR v2.0.3: Towards industrial adoption of scale-resolving simulations  
F. Witherden, P. Vincent, W. Trojak, Y. Abe, A. Akbarzadeh, S. Akkurt, M. Alhawwary, L. Caros, **T. Dzanic**, G. Giangaspero, A. Iyer, A. Jameson, M. Koch, N. Loppi, S. Mishra, R. Modi, G. Saez-Mischlich, J.S. Park, B. Vermeire, L. Wang. *Preprint, in review.*
14. High-order limiting methods using maximum principle bounds derived from the Boltzmann equation I: Euler equations  
**T. Dzanic**, L. Martinelli. *Preprint, in review.*
13. A note on higher-order and nonlinear limiting approaches for continuously bounds-preserving discontinuous Galerkin methods  
**T. Dzanic**. *Journal of Computational Physics*, 516, 113367, 2024.
12. Continuously bounds-preserving discontinuous Galerkin methods for hyperbolic conservation laws  
**T. Dzanic**. *Journal of Computational Physics*, 508, 113010, 2024.
11. Positivity-preserving discontinuous spectral element methods for compressible multi-species flows  
W. Trojak, **T. Dzanic**. *Computers & Fluids*, 280, 106343, 2024.
10. DynAMO: Multi-agent reinforcement learning for dynamic anticipatory mesh optimization with applications to hyperbolic conservation laws  
**T. Dzanic**, K. Mittal, D. Kim, J. Yang, S. Petrides, B. Keith, R. Anderson. *Journal of Computational Physics*, 506, 112924, 2024.

9. On the anti-aliasing properties of entropy filtering for under-resolved turbulent flows  
**T. Dzanic**, W. Trojak, F. Witherden. *International Journal of Computational Fluid Dynamics*, 37, 474-486, 2024.
8. Validation of wall boundary conditions for simulating complex fluid flows via the Boltzmann equation: Momentum transport and skin friction  
**T. Dzanic**, F. Witherden, L. Martinelli. *Physics of Fluids*, 36, 017109, 2024.
7. A positivity-preserving and conservative high-order flux reconstruction method for the polyatomic Boltzmann–BGK equation  
**T. Dzanic**, F. Witherden, L. Martinelli. *Journal of Computational Physics*, 486, 112146, 2023.
6. Positivity-preserving entropy filtering for the ideal magnetohydrodynamics equations  
**T. Dzanic**, F. Witherden. *Computers & Fluids*, 266, 106056, 2023.
5. Bounds preserving temporal integration methods for hyperbolic conservation laws  
**T. Dzanic**, W. Trojak, F. Witherden. *Computers & Mathematics with Applications*, 135, 6-18, 2023.
4. Positivity-preserving entropy-based adaptive filtering for discontinuous spectral element methods  
**T. Dzanic**, F. Witherden. *Journal of Computational Physics*, 468, 111501, 2022.
3. Utilizing time-reversibility for shock capturing in nonlinear hyperbolic conservation laws  
**T. Dzanic**, W. Trojak, F. Witherden. *Computers & Fluids*, 247, 105652, 2022.
2. Partially-averaged Navier–Stokes simulations of turbulence within a high-order flux reconstruction framework  
**T. Dzanic**, S. Girimaji, F. Witherden. *Journal of Computational Physics*, 456, 110992, 2022.
1. Accuracy, stability, and performance comparison between the spectral difference and flux reconstruction schemes  
C. Cox, W. Trojak, **T. Dzanic**, F. Witherden, A. Jameson. *Computers & Fluids*, 221, 104922, 2021.

## Conference Papers

9. Direct molecular gas dynamics simulations of re-entry vehicles via the Boltzmann equation  
**T. Dzanic**, L. Martinelli. *AIAA SciTech*, 2024.
8. Towards full molecular gas dynamics simulations of complex flows via the Boltzmann equation  
**T. Dzanic**, L. Martinelli. *Proceedings of the Cambridge Unsteady Flow Symposium*, p.10, 2024.
7. Multi-agent reinforcement learning for adaptive mesh refinement  
J. Yang, K. Mittal, **T. Dzanic**, S. Petrides, B. Keith, B. Peterson, D. Faissol, R. Anderson. *International Conference on Autonomous Agents and Multiagent Systems*, p.14-22, 2023.
6. Reinforcement learning for adaptive mesh refinement  
J. Yang, **T. Dzanic**, B. Peterson, J. Kudo, K. Mittal, V. Tomov, J.S. Camier, T. Zhao, H. Zha, Tz. Kolev, R. Anderson, D. Faissol. *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 26, p.5997-6014, 2023.
5. Shock capturing methods in high-order flux reconstruction I: Graph viscosity and convex limiting approaches  
W. Trojak, **T. Dzanic**, F. Witherden. *AIAA SciTech*, 2021.
4. Numerical analysis and prediction of aero-optical effects  
D. Hartman, **T. Dzanic**, F. Witherden, A. Tropina, R. Miles. *AIAA SciTech*, 2021.
3. Fourier spectrum discrepancies in deep network generated images  
**T. Dzanic**, K. Shah, F. Witherden. *Neural Information Processing Systems (NeurIPS)*, 33, p.3022-3032, 2020.
2. Non-equilibrium wall modeling for large eddy simulation of stalled iced airfoils  
**T. Dzanic**, J. Oefelein. *AIAA SciTech*, 2020.
1. Higher-order implicit large eddy simulations of a VFE-2 delta wing  
**T. Dzanic**, L. Martinelli. *AIAA SciTech*, 2019.



## Invited Talks & Conference Presentations

24. Towards full Boltzmann simulations of complex fluid flows via high-order, discretely-conservative numerical schemes  
*High-Order Nonlinear Numerical Methods for Evolutionary PDEs (HONOM)*. Chania, Greece. Sep 2024.
23. Provably robust limiting schemes for high-order discontinuous spectral element methods  
*Brown University*. Providence, RI, USA. May 2024.
22. Towards full molecular gas dynamics simulations of complex flows via the Boltzmann equation  
*Cambridge Unsteady Flow Symposium*. Cambridge University, Cambridge, UK. March 2024.
21. Continuously bounds-preserving limiting methods for high-order discontinuous Galerkin schemes  
*7th Chilean Workshop on Numerical Analysis of Partial Differential Equations*. Concepcion, Chile. Jan 2024.
20. Structure-preserving finite element methods for multi-physics applications  
*Office of Science Advanced Scientific Computing Research (ASCR) Principal Investigator Meeting*. Albuquerque, NM, USA. Jan 2024.
19. Constructing provably robust, constraint-satisfying finite element methods for computational physics  
*Brown University*. Providence, RI, USA. Nov 2023.
18. High-order computational fluid dynamics schemes on GPU architectures  
*NASA Ames Research Center*. Mountain View, CA, USA. Jun 2023.
17. A positivity-preserving and conservative high-order flux reconstruction method for the polyatomic Boltzmann–BGK equation  
*22nd IACM Computational Fluids Conference*. Cannes, France. April 2023.
16. Constructing provably robust, constraint-satisfying finite element methods for computational physics  
*Lawrence Livermore National Lab*. Livermore, CA, USA. April 2023.
15. A positivity-preserving and conservative high-order flux reconstruction method for the polyatomic Boltzmann–BGK equation  
*Society for Applied and Industrial Mathematics TX-LA Symposium*. Houston, TX, USA. Nov 2022.
14. Positivity-preserving entropy-based adaptive filtering for shock capturing  
*PyFR Seminar Series*. Imperial College London, London, UK. Aug 2022.
13. Utilizing time-reversibility for shock capturing in nonlinear hyperbolic conservation laws  
*15th World Congress on Computational Mechanics*. Yokohama, Japan. Aug 2022.
12. Positivity-preserving entropy-based adaptive filtering for discontinuous spectral element methods  
*8th European Congress on Computational Methods in Applied Sciences and Engineering*. Oslo, Norway. June 2022.
11. Bounds preserving temporal integration methods for hyperbolic conservation laws  
*Society for Applied and Industrial Mathematics TX-LA Symposium*. South Padre Island, TX, USA. Nov 2021.
10. Shock capturing in nodal spectral element methods via Riemann solutions for intra-element fluxes  
*16th U.S. National Congress on Computational Mechanics*. Chicago, IL, USA. July 2021.
9. Shock capturing for high-order nodal spectral element methods  
*PyFR Seminar Series*. Imperial College London, London, UK. April 2021.
8. Variable resolution turbulence modeling within a flux reconstruction framework  
*14th World Congress in Computational Mechanics/ECCOMAS*. Paris, France. Jan 2021.
7. Fourier spectrum discrepancies in deep network generated images  
*Neural Information Processing Systems*. Vancouver, Canada. Dec 2020.
6. A Riemann difference scheme for shock capturing in discontinuous finite element methods  
*Society for Applied and Industrial Mathematics TX-LA Symposium*. College Station, TX, USA. Oct 2020.


5. Partially-averaged Navier-Stokes in PyFR  
*PyFR Symposium*. Imperial College London, London, UK. July 2020.
4. Non-equilibrium wall modeling for large eddy simulation of stalled iced airfoils  
*AIAA SciTech*. Orlando, FL, USA. Jan 2020.
3. Higher-order implicit large eddy simulations of a VFE-2 delta wing  
*AIAA SciTech*. San Diego, CA, USA. Jan 2019.
2. Toward high-fidelity, high-resolution aerodynamic analysis of iced airfoils  
*Federal Aviation Administration JUP Conference*. The University of Ohio, Athens, Ohio, USA. July 2018.
1. Implicit large eddy simulations of vortex dominated flows  
*Federal Aviation Administration JUP Conference*. Massachusetts Institute of Technology, Cambridge, MA, USA. Oct 2017.

## Funding & Grants

### Principal Investigator

- 2024 – 2025     Continuously bounds-preserving finite element methods for multi-physics applications  
*Sponsor*: Office of Science Advanced Scientific Computing Research  
*Award*: \$258,000
- 2023 – 2024     Continuously bounds-preserving finite element methods for multi-physics applications  
*Sponsor*: Department of Energy Laboratory Directed Research and Development  
*Award*: \$207,000

### Co-principal Investigator

- 2024 – 2025     Direct numerical simulation of the Boltzmann equation for hypersonic transitional boundary layers  
*Sponsor*: Oak Ridge Leadership Computing Facility Director's Discretionary Program  
*Award*: 62,800 GPU-hours on Frontier at OLCF (est. value \$125,000)

## Selected Honors & Awards

- 2024     Computing Directorate SPOT Award, *Lawrence Livermore National Lab*
- 2023     Sidney Fernbach Postdoctoral Fellowship Recipient, *Lawrence Livermore National Lab*
-  1851 Research Fellowship Finalist, *Royal Commission for the Exhibition of 1851*
-  Luis J. Alvarez and Admiral Grace M. Hopper Postdoctoral Fellowship Finalist, *Lawrence Berkeley National Lab*
-  Editor's Pick, *Physics of Fluids*
-  Art of Science Showcase, *Air Force Office of Scientific Research*
- 2021     SIAM Travel Award, *Society for Industrial and Applied Mathematics*
- 2019     Department Excellence Fellowship, *Texas A&M University*
- 2018     George Bienkowski Memorial Prize, *Princeton University*
- 2014 – 2018     QuestBridge Scholarship, *Princeton University*

## Service

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**Reviewed for:**     ■ AIAA Journal, Cambridge Unsteady Flow Symposium, Computers & Mathematics with Applications, Computer Physics Communications, International Journal of Computational Fluid Dynamics, Journal of Computational Physics, Journal of Computational and Theoretical Transport, Journal of Ocean Engineering, Physics of Fluids

**Volunteering:**     ■ Girls Who Code, LLNL Summer Research Slam, QuestBridge

## Teaching Experience

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- 2022     ■ Teaching Assistant for OCEN 345: Theory of Ocean Engineering Structures  
*Texas A&M University*
- 2021     ■ Teaching Assistant for OCEN 405: Finite Element Analysis in Engineering Design  
*Texas A&M University*
- 2020     ■ Teaching Assistant for OCEN 261: Applied Numerical Methods with Python  
*Texas A&M University*
- 2019     ■ Teaching Assistant for AE 3340: Design and Systems Engineering Methods  
*Georgia Institute of Technology*
- 2018     ■ Teaching Assistant for AE 3340: Design and Systems Engineering Methods  
*Georgia Institute of Technology*