Ben Wilfong

1 Basic Information

Title: Graduate Research Assistant
Citizenship: United States of America

Georgia Institute of Technology
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Research Interests: Computational fluid dynamics, multiphase fluid dynamics, high performance computing, GPU accelerated computing, distributed computing, numerical methods for PDEs, scientific computing

2 Education

Georgia Institute of Technology
(In Progress) Doctor of Philosophy, Computational Science and Engineering
Advisor: Dr. Spencer Bryngelson
Relevant coursework: High Performance Computing (S24), Turbulent Fluid Flows (S24), Iterative Methods for Systems of Equations (F23), Numerical Linear Algebra (S23), Viscous Fluid Flows (F22)

Rose–Hulman Institute of Technology
(2022) Bachelor of Science, Mechanical Engineering and Computational Science

3 Experience

Weapons and Complex Integration Intern — June 2022 – August 2022

Institution: Lawrence Livermore National Laboratory
Supervisor: Dr. Kyle Sinding
Duties: Perform finite element simulation using LLNL's HPC resources using ALE3D, generate case files and input data, post-process data to gather useful quantities of interest like shock wave arrival time and pressure profiles

EERE High Performance Computing for Manufacturing Intern — June 2021 – August 2021

Institution: Lawrence Livermore National Laboratory in collaboration with Oak Ridge Institute for Science and Education (ORISE)
Supervisor: Dr. John Karnes
Duties: Perform molecular dynamics simulations using LLNL's HPC resources using LAMMPS, generate case files and input data, post-process data to gather useful quantities of interest like reaction rates and percent conversion

4 Awards

(2025) ACM Gordon Bell Prize Finalist (*Simulating many-engine spacecraft: Exceeding 1 quadrillion degrees of freedom via information geometric regularization*)

- (2024) CRNCH Fellowship for Novel Computing Paradigms and Hierarchies
- (2022) Georgia Tech Presidents Fellowship
- (2018-22) Deans List, Rose–Hulman Institute of Technology

5 Professional activity

5.1 Memberships

- (2024-Present) Association for Computing Machinery (ACM), Member
- (2024-Present) American Physical Society (APS), Member

6 Service and Outreach

- (2025) SC25 student volunteer
- (2023-Present) Presidents undergraduate research award reviewer
- (2023-24) CSE Graduate Student Association vice-president
- (2022-23) CSE Graduate Student Association events officer

7 Media

The following media mentions work that I have made significant contributions to, either through direct authorship or as a member of the research team.

- (2025) Fluid Flow Simulation on Frontier earns Gordon Bell Finalist Selection [LINK]
- (2025) Shock Treatment for CFD Simulation [LINK]
- (2025) The OLCF's Problem Busters [LINK]
- (2023) Group Optimizes Fluid Dynamics Simulator on World's Fastest Supercomputer [LINK]

8 Publications

8.1 Preprints

[PP2] B. Wilfong, A. Radhakrishnan, H. Le Berre, D. J. Vickers, T. Prathi, N. Tselepidis, B. Dorschner, R. Budiardja, B. Cornille, S. Abbott, F. *Schäfer, and S. H. *Bryngelson (2025). "Simulating many-engine spacecraft: Exceeding 1 quadrillion degrees of freedom via information geometric regularization". arXiv:2505.07392, *Equal contribution. DOI: 10.48550/arXiv.2505.07392

[PP1] B. *Wilfong, H. *Le Berre, A. *Radhakrishnan, A. Gupta, D. Vaca-Revelo, D. Adam, H. Yu, H. Lee, J. R. Chreim, M. Carcana Barbosa, Y. Zhang, E. Cisneros-Garibay, A. Gnanaskandan, M. Rodriguez Jr., R. D. Budiardja, S. Abbott, T. Colonius, and S. H. Bryngelson (2025). "MFC 5.0: An exascale many-physics flow solver". *Equal contribution. DOI: 10.48550/arXiv.2503.07953

8.2 Archival, heavily referred papers

[P2] T. Chu, B. Wilfong, T. Koehler, R. M. McMullen, and S. H. Bryngelson (2025). "Competing mechanisms at vibrated interfaces of density-contrast fluids". In: *Physical Review Fluids* 10 (9), p. 093904. DOI: 10.1103/r9b3-psg4

[P1] A. Radhakrishnan, H. Le Berre, B. Wilfong, J.-S. Spratt, M. Rodriguez Jr., T. Colonius, and S. H. Bryngelson (2024). "Method for portable, scalable, and performant GPU-accelerated simulation of multiphase compressible flow". In: *Computer Physics Communications* 302, p. 109238. DOI: 10.1016/j.cpc.2024.109238

8.3 Conference papers

[C3] B. Wilfong, A. Radhakrishnan, H. A. Le Berre, T. Prathi, S. Abbott, and S. H. Bryngelson (2025). "Testing and benchmarking emerging supercomputers via the MFC flow solver". In: *Proceedings of the SC '25 Workshops of The International Conference on High Performance Computing, Network, Storage, and Analysis*. DOI: 10.48550/arXiv.2509.13575

[C2] B. Wilfong, A. Radhakrishnan, H. A. Le Berre, S. Abbott, R. D. Budiardja, and S. H. Bryngelson (2024). "OpenACC offloading of the MFC compressible multiphase flow solver on AMD and NVIDIA GPUs". In: *Proceedings of the SC '24 Workshops of The International Conference on High Performance Computing, Network, Storage, and Analysis*. DOI: 10.1109/SCW63240.2024.00242

[C1] B. A. Wilfong, R. McMullen, T. Koehler, and S. H. Bryngelson (2024). "Instability of Two-Species Interfaces via Vibration". In: *AIAA AVIATION FORUM AND ASCEND 2024*. DOI: 10.2514/6.2024-4480

8.4 Conference talks

[T3] B. Wilfong, T. Chu, R. McMullen, T. Koehler, and S. H. Bryngelson (2025). *Hydrodynamic instability and breakup of a liquid-gas interface via vibration.* 75th Annual Meeting of the APS Division of Fluid Dynamics (APS DFD). Houston, TX

[T2] B. Wilfong, T. Chu, R. McMullen, T. Koehler, and S. H. Bryngelson (2024). *Hydrodynamic instability and breakup of a liquid-gas interface via vibration.* 74th Annual Meeting of the APS Division of Fluid Dynamics (APS DFD). Salt Lake City, UT

[T1] B. Wilfong, A. Radhakrishnan, and S. H. Bryngelson (2024). *Multiphase flow numerics: Perspectives from exascale simulation.* 5th International Conference on Numerical Methods for Multiphase Flow (ICNMMF). Reykjavik, Iceland

9 Skills

- *Programming Languages/Paradigms:* Fortran, OpenACC, MPI, Matlab, Bash
- *Software and Tools:* Paraview, VisIt, Solidworks, SLURM, PBS, Nsys Systems, Nsight Compute, RocProf, Omniperf, fypp