Spencer H. Bryngelson

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Education

- (Dec. 2017) Ph.D., Theoretical & Applied Mechanics, University of Illinois at Urbana–Champaign
- (2015) M.S., Theoretical & Applied Mechanics, University of Illinois at Urbana–Champaign
- (2013) B.S., Mechanical Engineering & Engineering Mathematics, University of Michigan–Dearborn

Research positions

- (2021–Present) Assistant Professor, School of Computational Science & Engineering, College of Computing, Georgia Institute of Te
- (2022) Visiting Scholar, Stanford University, Center for Turbulence Research
- (2018–21) Senior Postdoctoral Scholar, California Institute of Technology
- (2019) Visiting Researcher, Massachusetts Institute of Technology
- (2017–18) Postdoctor Researcher, XPACC (PSAAP II)
- (2013–17) Graduate Research Fellow, University of Illinois at Urbana–Champaign

Awards (abbreviated)

- (2022–23) Georgia Tech Faculty Writing Scholar
- (2022–23) Class of 1969 Teaching Fellow, Georgia Institute of Technology
- (2022) Ralph E. Powe Junior Faculty Enhancement Award, Oak Ridge National Lab
- (2017) Stanley Weiss Outstanding Dissertation Award, University of Illinois at Urbana–Champaign
- (2016) Hassan Aref Award (research in fluid mechanics), University of Illinois at Urbana–Champaign
- (2015) Alumni Teaching Fellowship, University of Illinois at Urbana–Champaign

Abbreviated funding history

- (2023–24) co-PI: DARPA "*Quantum eigensolvers in fluid-dynamic computations and applications*"
- (2023–27) PI: DOD ARO "*Investigation and inference of soft material deformation mechanisms unlocked at large speeds, finite deformations, and many cycles*,"
- (2023–27) co-PI: DOD ONR MURI "*Combustion of solid fuels in high enthalpy flow*"
- (2022–26) PI: DOD ONR, "*Stochastic framework for cavitating flows*"
- (2022–24) PI: DOE "*Vibrated bubbly flow simulation*" ($100K)
- (2022–23) PI: DOE, "*A methodologically coherent multi-scale model for multiphase flow*"
- (2022–24) co-PI: GTRI IRAD, "*Quantum optimization for lattice Boltzmann simulation*"
- (2022–23) PI: GT Seed Grant, "*Quantum computing for next-generation engineering simulation*"
- (2022–23) PI: Georgia Tech Quantum Alliance, "*Quantum algorithms for fluid flow simulation*"
- (2021–23) PI: OLCF Allocation, "*Accelerated sub-grid multi-component flow physics*"
- (2022) PI: NVIDIA Academic Hardware Grant Program (4x BlueField-2 E-Series DPU, 2x A100-80)
- (2022) PI: Georgia Tech Tech. Fee "*ARM HPC Dev Kits for next-generation supercomputing*" (10 NVIDIA ARM HPC Dev. Kits, $240K value)
- (2022) PI: Gift: AMD MI200-series GPU Server
- (2022) PI: Stanford CTR Summer Program "*Fast macroscopic forcing for operator recovery via locality and causality with application to compressible and multiphase flow*"

Papers

[1] *Bryngelson, S. H., F. *Schäfer, J. Liu, et al. (2023). "Fast Macroscopic Forcing Method". arXiv: 2306.13625, *Authors contributed equally.

[2] Bati, A. and S. H. Bryngelson (2023). "RoseNNa: A performant, portable library for neural network inference with application to computational fluid dynamics". arXiv: 2307.16322.

[3] Chrit, F. E., S. Kocherla, B. Gard, et al. (2023). "Fully quantum algorithm for lattice Boltzmann methods with application to partial differential equations". arXiv: 2305.07148.

[4] Liu, J., F. Schäfer, S. H. Bryngelson, et al. (2023). "Targeted computation of nonlocal closure operators via an adjoint-based macroscopic forcing method". arXiv: 2310.08763.

[5] Radhakrishnan, A., H. Le Berre, B. Wilfong, et al. (2023). "Method for portable, scalable, and performant GPU-accelerated simulation of multiphase compressible flow". arXiv: 2305.09163.

[6] Bryngelson, S. H., R. O. Fox, and T. Colonius (2023). "Conditional moment methods for polydisperse cavitating flows". *Journal of Computational Physics* **477**, 111917.

[7] Firouznia, M., S. H. Bryngelson, and D. Saintillan (2023). "A spectral boundary integral method for simulating electrohydrodynamic flows in viscous drops". *Journal of Computational Physics* **489**, 112248.

[8] Panchal, A., S. H. Bryngelson, and S. Menon (2023). "A seven-equation diffused interface method for resolved multiphase flows". *Journal of Computational Physics* **475**, 111870.

[9] Charalampopoulos, A., S. H. Bryngelson, T. Colonius, et al. (2022). "Hybrid quadrature moment method for accurate and stable representation of non-Gaussian processes and their dynamics". *Philosophical Transactions of the Royal Society A* **380** 2229.

[10] Chrit, F. E., S. Kocherla, A. Adams, et al. (2022). "Quantum lattice algorithms for solving partial differential equations". *17th Conference on Theory of Quantum Computation, Communication, and Cryptography.*

[11] Bryngelson, S. H., K. Schmidmayer, V. Coralic, et al. (2021). "MFC: An open-source high-order multi-component, multi-phase, and multi-scale compressible flow solver". *Computer Physics Communications* **266**, 107396.

[12] Spratt, J.-S., M. Rodriguez, K. Schmidmayer, et al. (2021). "Characterizing viscoelastic materials via ensemble-based data assimilation of bubble collapse observations". *Journal of the Mechanics and Physics of Solids* **152**, 104455.

[13] Bryngelson, S. H., A. Charalampopoulos, T. P. Sapsis, and T. Colonius (2020). "A Gaussian moment method and its augmentation via LSTM recurrent neural networks for the statistics of cavitating bubble populations". *International Journal of Multiphase Flow* **127**, 103262.

[14] Bryngelson, S. H. and T. Colonius (2020). "Simulation of humpback whale bubble-net feeding models". *Journal of the Acoustical Society of America* **147** 2, 1126–1135.

[15] Bryngelson, S. H., T. Colonius, and R. O. Fox (2020). "QBMMlib: A library of quadrature-based moment methods". *SoftwareX* **12**, 100615.

[16] Schmidmayer, K., S. H. Bryngelson, and T. Colonius (2020). "An assessment of multicomponent flow models and interface capturing schemes for spherical bubble dynamics". *Journal of Computational Physics* **402**, 109080.

[17] Trummler, T., S. H. Bryngelson, K. Schmidmayer, et al. (2020). "Near-surface dynamics of a gas bubble collapsing above a crevice". *Journal of Fluid Mechanics* **899**, A16.

[18] Bryngelson, S. H. and J. B. Freund (2019). "Non-modal Floquet stability of a capsule in large amplitude oscillatory extension". *European Journal of Mechanics B/Fluids* **77**, 171–176.

[19] Bryngelson, S. H., F. Guéniat, and J. B. Freund (2019). "Irregular dynamics of cellular blood flow in a model microvessel". *Physical Review E* **100**, 012203.

[20] Bryngelson, S. H., K. Schmidmayer, and T. Colonius (2019). "A quantitative comparison of phase-averaged models for bubbly, cavitating flows". *International Journal of Multiphase Flow* **115**, 137–143.

[21] Bryngelson, S. H. and J. B. Freund (2018). "Floquet stability analysis of capsules in viscous shear flow". *Joural of Fluid Mechanics* **852**, 663–677.

[22] Bryngelson, S. H. and J. B. Freund (2018). "Global stability of flowing red blood cell trains". *Physical Review Fluids* **3** 7, 073101.

[23] Bryngelson, S. H. and J. B. Freund (2016). "Buckling and its effect on the confined flow of a model capsule suspension". *Rheologica Acta* **55** 6, 451–464.

[24] Bryngelson, S. H. and J. B. Freund (2016). "Capsule-train stability". *Physical Review Fluids* **1** 3, 033201.