West Lafayette, IN 47906 Contact: +1 765-476-6299

# Areas of expertise

Parallel/Distributed computing; Quantum information/computing; Numerical analysis; Reinforcement learning

# Education

Purdue University, West Lafayette PhD in Aeronautics and Astronautics, May'18 - May'21 Major: Aerodynamics, Minor: Computational Science, CGPA: 3.89/4 Dissertation: High Accuracy Methods for Boltzmann Equation and Related Kinetic Models
MS in Physics and Astronomy
MS in Aeronautics and Astronautics
Indian Institute of Technology (IIT), Hyderabad  B.Tech in Mechanical Engineering
Work Experience  Altair Engineering, Troy, MI
Purdue University, West Lafayette, IN
Mentor Graphics (Siemens), Wilsonville, OR
Indian Institute of Technology, Hyderabad

### General Skillset

Programming: C++, Python, Javascript, Tcl, CUDA

Tools/Frameworks: Tensorflow, PyTorch, Unity, Qiskit, OpenFOAM, ZeroMQ, React

- Programming in Python, C++ (8+ years).
- Parallel and distributed computing: MPI, CUDA, OpenMP, JAX.
- Cloud computing: containers and micro-services design.
- Development of quantum algorithms and quantum software stacks.
- Development of numerical schemes for solving partial differential equations.
- Finite element, isogeometric schemes, multi-physics design, simulation, and analysis.
- Experience with writing performance portable codes, profiling (LLVM sanitizers, valgrind, udb, gdb, nvprof).

Development of distributed algorithms for modeling continuum multi-phase flows in arbitrary geometries.

- Proficient working in a Linux/UNIX environment; git/subversion/p4, build/test systems, testing/release processes.

#### Patents

- [1] Limited basis quantum particle definitions in applications of quantum computing to electronic design automation processes, (2020), US Patent 10,846,448.
- [2] Adaptive penalty term determinations in applications of quantum computing to electronic design automation processes. (2020), US Patent App. 16/688,028

# Research publications

- [3] S. Jaiswal, An entropy stable scheme for the non-linear Boltzmann equation, J. Comput. Phys. 463 (2022).
- [4] S. Jaiswal, Non-linear Boltzmann equation on hybrid-unstructured non-conforming multi-domains, J. Comput. Phys. 450 (2022).
- [5] S. Jaiswal, Isogeometric schemes in rarefied gas dynamics context, Comput. Methods Appl. Mech. Eng. 383, 113926 (2021).
- [6] S. Jaiswal, A. A. Alexeenko, and J. Hu, A discontinuous Galerkin fast spectral method for the multi-species Boltzmann equation. Computer Methods in Applied Mechanics and Engineering 352, 56 (2019).
- [7] S. Jaiswal, A. A. Alexeenko, and J. Hu, A discontinuous Galerkin fast spectral method for the full Boltzmann equation with general collision kernels. Journal of Computational Physics 378, 178 (2019).
- [8] S. Jaiswal, J. Hu, J. K. Brillon, and A. A. Alexeenko, A discontinuous Galerkin fast spectral method for multi-species full Boltzmann on streaming multi-processors, in Proceedings of the Platform for Advanced Scientific Computing Conference, PASC '19 (ACM, 2019) pp. 4:1–4:9.
- [9] S. Jaiswal, J. Hu, and A. A. Alexeenko, Fast deterministic solution of the full boltzmann equation on graphics processing units, AIP Conference Proceedings 2132, 060001 (2019).
- [10] S. Jaiswal, R. Reddy, R. Banerjee, S. Sato, D. Komagata, M. Ando, and J. Okada, An efficient GPU parallelization for arbitrary collocated polyhedral finite volume grids and its application to incompressible fluid flows. in 23rd IEEE High Performance Computing Workshop (IEEE, 2016).
- [11] S. Jaiswal, I. B. Sebastião, A. Strongrich, and A. A. Alexeenko, FEMTA micropropulsion system characterization by DSMC, AIP Conference Proceedings 2132, 070006 (2019).
- [12] **S. Jaiswal**, I. B. Sebastião, and A. A. Alexeenko, *DSMC-SPARTA implementation of M-1 scattering model*, AIP Conference Proceedings **2132**, 070023 (2019).
- [13] A. Pikus, I. B. Sebastião, S. Jaiswal, M. Gallis, and A. A. Alexeenko, DSMC-SPARTA implementation of majorant collision frequency scheme, AIP Conference Proceedings 2132, 070026 (2019).
- [14] S. Holay, R. Reddy, S. Jaiswal, and R. Banerjee, High fidelity simulations of binary collisions of liquid drops. in 18th Annual Conference on Liquid Atomization and Spray Systems (ILASS, 2016).
- [15] S. Jaiswal and N. Dongari, Implementation of Knudsen layer effects in open source CFD solver for effective modeling of microscale gas flows. in Proceedings of 1st International ISHMT-ASTFE and 23rd National Heat and Mass Transfer conference (ISHMT-ASTFE, Kerala, India, 2015)

### Invited research papers

[16] S. Jaiswal, A. Pikus, A. Strongrich, I. B. Sebastião, J. Hu, and A. A. Alexeenko, Quantification of thermally-driven flows in microsystems using Boltzmann equation in deterministic and stochastic contexts. Physics of Fluids 31, 082002 (2019), [Invited].

### Major projects (nationally recognized)

I co-wrote the National Science Foundation Grant #1854829 based on my PhD thesis. The goal of the project is to develop an open-source massively parallel computational software for scientific simulation of rarefied flows.