West Lafayette, IN 47906
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Shashank Jaiswal
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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 ..... Aug'19 - May'21
Major: Quantum Information/Computing, CGPA: 3.8/4
Research: Development of quantum algorithms

MS in Aeronautics and Astronautics ..... Aug'16 - May'18
Major: Aerodynamics, Minor: Computational Science, CGPA: 3.88/4
Dissertation: Discontinuous Galerkin Fast Spectral Method for Full Boltzmann Equation with General Collision Kernels: Theory, Computation, and Applications

Indian Institute of Technology (IIT), Hyderabad

B.Tech in Mechanical Engineering ..... Aug'12 - May'16
Major: Computational Fluid Dynamics, CGPA: 8.28/10
Research: Distributed numerical methods for continuum multi-phase Navier-Stokes equations

Work Experience

Altair Engineering, Troy, MI ..... 17 May'21 - 16 Sept'22
Sr. Software Developer - High Performance Computing
Development of distributed algorithms for design automation processes.

Purdue University, West Lafayette, IN ..... 1 Jan'17 - 15 March'21
Research Assistant with *Dr. Jingwei Hu, and Dr. Alina Alexeenko (Associate Dean)*
Development of numerical methods for kinetic equations, implementation on distributed systems, and applications.

Mentor Graphics (Siemens), Wilsonville, OR ..... 6 May'19 - 6 Sep'19
R&D Calibre Design-to-silicon Intern with *Dr. Fedor Pikus (Chief engineering scientist)*
Development of quantum algorithms for electronic design automation processes.

Indian Institute of Technology, Hyderabad ..... 1 Jan'15 - 1 July'16
Research Assistant with *Dr. Raja Banerjee, and Dr. Nishanth Dongari*
Development of distributed algorithms for modeling continuum multi-phase flows in arbitrary geometries.

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).
- 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)

Purdue University, West Lafayette ..... 1 Jan'17 - 15 March 21

Principle developer

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.