Roshan Samuel

Personal Information

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GitHub: https://github.com/roshansamuel
Google Scholar: https://scholar.google.co.in/citations?user=LLwzMe8AAAAJ

Education

2017–2023 **Ph.D. Mechanical Engineering**
Indian Institute of Technology - Kanpur, Kanpur, India
Thesis: Simulations of Rayleigh-Bénard Convection at Extreme Rayleigh Numbers
CGPA: 9.5/10.0

2011–2013 **M.E. Mechanical Engineering**
Indian Institute of Science - Bangalore, Bangalore, India
Thesis: Development of Vortex Particle Method for Flexing Bodies
CGPA: 5.9/8.0

2007–2011 **B.Tech. Mechanical Engineering**
National Institute of Technology - Tiruchirapalli, Tamil Nadu, India
Project: Design and Analysis of Multi-link Suspension
CGPA: 8.4/10.0

Professional Experience

2023–Now **Fluid Mechanics Group**
Affiliation: Department of Mechanical Engineering, TU-Ilmenau
Supervisor: Prof Jörg Schumacher

2016–2017 **Simulation and Modeling Lab**
Affiliation: Department of Physics, IIT-Kanpur
Project: Development of finite-difference solver in Python
Supervisor: Prof Mahendra K. Verma

2014–2016 **High Performance Computing Lab**
Affiliation: Department of Aerospace Engineering, IIT-Kanpur
Project: Development of compressible flow code with compact schemes
Supervisor: Prof Tapan K. Sengupta

2013–2014 **General Motors Technical Center - India**
Position: Thermal CFD Engineer
Responsibilities: CFD Analysis of automotive cabins and under-hood systems

Publications

Journal Publications

1. **Samuel, R.**, Bode, M., Scheel, J. D., Sreenivasan, K. R., and Schumacher, J. No

sustained mean velocity in the boundary region of plane thermal convection. *Journal of Fluid Mechanics 996* (2024), A49

2. **Samuel, R.** and Verma, M. K. Bolgiano-obukhov scaling in two-dimensional rayleigh-bénard convection at extreme rayleigh numbers. *Phys. Rev. Fluids 9* (2024), 023502
3. **Samuel, R.**, Samtaney, R., and Verma, M. K. Large-eddy simulation of Rayleigh-Bénard convection at extreme Rayleigh numbers. *Phys. Fluids 34*, 7 (2022), 075133
4. Sengupta, A., **Samuel, R. J.**, Sundaram, P., and Sengupta, T. K. Role of non-zero bulk viscosity in three-dimensional Rayleigh-Taylor instability: Beyond Stokes' hypothesis. *Comput. Fluids 225* (2021), 104995
5. **Samuel, R.**, Bhattacharya, S., Asad, A., Chatterjee, S., Verma, M. K., Samtaney, R., and Anwer, S. F. SARAS: A general-purpose PDE solver for fluid dynamics. *J. Open Source Softw. 6*, 64 (2021), 2095
6. Verma, M. K., **Samuel, R.**, Chatterjee, S., Bhattacharya, S., and Asad, A. Challenges in fluid flow simulations using exascale computing. *SN Comput. Sci. 1*, 3 (2020), 178
7. Sadhukhan, S., **Samuel, R.**, Plunian, F., Stepanov, R., Samtaney, R., and Verma, M. K. Enstrophy transfers in helical turbulence. *Phys. Rev. Fluids 4* (2019), 084607
8. Vashishtha, S., **Samuel, R.**, Chatterjee, A. G., Samtaney, R., and Verma, M. K. Large eddy simulation of hydrodynamic turbulence using renormalized viscosity. *Phys. Fluids 31*, 6 (2019), 065102
9. Vashishtha, S., Verma, M. K., and **Samuel, R.** Large-eddy simulations of turbulent thermal convection using renormalized viscosity and thermal diffusivity. *Phys. Rev. E 98* (2018), 043109
10. Sharma, N., Sengupta, A., Rajpoot, M., **Samuel, R. J.**, and Sengupta, T. K. Hybrid sixth order spatial discretization scheme for non-uniform cartesian grids. *Comput. Fluids 157* (2017), 208–231

Conference Presentations

1. **Samuel, R.**, Bode, M., Scheel, J. D., Sreenivasan, K. R., and Schumacher, J. Plume- and Shear-Dominated Boundary Layer Sections in High Rayleigh Number Convection. *1st European Fluid Dynamics Conference*, Aachen, 16-20 September, 2024
2. **Samuel, R.**, Shevkar, P. P., Bode, M., Scheel, J. D., Sreenivasan, K. R., and Schumacher, J. Unraveling the Boundary Layers of High Rayleigh Number Convection through Direct Numerical Simulations. *35th Parallel CFD International Conference*, Bonn, 2-4 September, 2024
3. **Samuel, R.**, Bode, M., Sreenivasan, K. R., and Schumacher, J. Analysis of boundary layers by high-resolution DNS of Rayleigh-Bénard convection. *14th Workshop on Direct and Large-Eddy Simulation*, Erlangen, 10-12 April, 2024
4. **Samuel, R.**, Scheel, J. D., Bode, M., Witzler, C., Göbbert, J. H., Sreenivasan, K. R., and Schumacher, J. High-resolution simulation boundary layer studies in Rayleigh-Bénard convection. *76th Annual Meeting of the Division of Fluid Dynamics*, Washington DC, 19-21 November, 2023
5. **Samuel, R.**, Verma, M. K., and Schumacher, J. Bolgiano-Obukhov Scaling in Two-Dimensional Rayleigh-Bénard Convection. *18th European Turbulence Conference*, Valencia, 4-8 September, 2023
6. **Samuel, R.**, Samtaney, R., and Verma, M. K. Large-eddy simulation of Rayleigh-Bénard convection at extreme Rayleigh numbers up to 10^{15}. *Euromech Colloquium 619*, Vienna, 6-9 July, 2022

Thesis

1. **Samuel, R.** *Simulations of Rayleigh-Bénard Convection at Extreme Rayleigh Numbers*. PhD thesis, IIT Kanpur, 2024
2. **Samuel, R.** *Development of Vortex Particle Method for Flexing Bodies*. Master's thesis, IISc Bangalore, 2013

Schools and Workshops Attended

2021	GPU Application Hackathon organized by CDAC and Nvidia
2019	Organized short-term course on "HPC in Engineering" at IIT-Kanpur
2018	Turbulence from Angstroms to Lightyears organized by ICTS, Bangalore

Software Developed/Contributed

2019	blitz++: Contributed to development of Blitz library.
2020	SARAS: Developed the open-source finite-difference solver.

Honors, Awards & Scholarships

2024	Best Paper in Mini-Symposium 9 at 35th ParCFD Conference in Bonn, Germany
2014	Green Belt in Design for Six-Sigma (DFSS) awarded at General Motors
2014	Individual Excellence Award by General Motors for design synthesis using CFD thermal simulations
2014	Individual Excellence Award by General Motors for developing scripts to automate CFD analysis
2010	Summer Undergraduate Research Grant for Excellence (SURGE) awarded by IIT-Kanpur

Certifications

2013	Training Certificate in Introduction of ANSYS Design, ANSYS Meshing and FLUENT awarded by ANSYS
2010	Attendance Certificate in A1 - Elementary Level 1 German by Goethe Institut/Max Mueller Bhavan Chennai
2009	Certificate in Foundation Course on CATIA V5R15 awarded by CADD Center

Personal Interests

Hobby Programming, Astronomy

Languages

English, Malayalam (native)

Hindi (basic)

French, German (beginner)

November 28, 2024