AKASH RODHIYA

(+1)3322769714 ⋄ ar8303@nyu.edu
Website ⋄ Github ⋄ Google scholar

RESEARCH INTERESTS

Turbulence, Combustion, Computational Fluid Dynamics, Scientific data analysis, High-performance computing, Parallel programming, Machine learning, PINNs

CURRENT POSITION

Tandon School of Engineering, New York University, New York *Aug 2023 - ongoing*
Doctoral student GPA: 3.9/4.0
Tandon School of Engineering, NYU

EDUCATION

Indian Institute of Science Bangalore, India *Aug 2019 - June 2022*
Masters of Technology (Research Program) CGPA: 9.3/10
Department of Computational and Data Sciences

Indian Institute of Technology (BHU) Varanasi, India *July 2015 - May 2019*
Bachelor of Technology CGPA: 8.01/10
Department of Mechanical Engineering

PUBLICATIONS

AIAA Propulsion and Energy 2021 Published

Rodhiya, A., Aditya, K., Gruber, A., & Chen, J. H. (2021). Simulations of flame structure in a reheat burner: pressure scaling.

Combustion and Flame, 2023 Published

A Jonnalagadda, SP Kulkarni, **A Rodhiya**, H Kolla, K Aditya (2022). A co-kurtosis based dimensionality reduction method for combustion datasets.

Combustion and Flame, 2024 Accepted

A Rodhiya, A Gruber, M R Bothien, J H Chen, K Aditya. Spontaneous ignition and flame propagation in hydrogen/methane wrinkled flames at reheat conditions: effect of pressure and hydrogen fraction.

RESEARCH PROJECTS

Studying the decaying turbulence using Numerical and data-driven methods. *NYU*
We are studying the characteristics of the decaying turbulence using Direct Numerical Simulations and Machine Learning

- Performed a few numerical simulations at different Reynolds numbers.
- Future simulations with high grid size and high Reynolds number will be set up.
- Literature review for different applications of Machine learning in expanding knowledge space of decaying turbulence is under progress.

Comparing Pseudo spectral and finite difference solver using Direct Numerical Simulations *IIT Kanpur*

This work compares two numerical methods, the Finite Difference Method and the Pseudo-Spectral method for solving Navier-Stokes equations.

- Performed three-dimensional forced Periodic box simulations at different Reynolds numbers.
- Compared different properties of the turbulence showing both numerical approximations giving a statistically similar solution.
- A full-fledged manuscript for the Journal of Physics of Fluids is prepared.

Numerical simulations of hydrogen flames in reheat gas turbine combustor: effect of pressure scaling and fuel blending *IISc Bangalore*

This work focuses on the combustion characteristics of hydrogen and its blend with methane at a lean premixed setting relevant to reheat burner in stationary gas turbines.

- Two-dimensional numerical simulations were performed using the S3D solver at different pressures and hydrogen-methane blending ratios.
- Scaling of flame structure with the pressure and methane fraction is analyzed and a shift in the chemical pathway with pressure is observed.
- The effect of three-dimensional turbulent mixing is also analyzed at 01 bar pressure.
- Chemical Explosive Mode Analyses (CEMA) is performed, and a trend in the combustion mode across pressure levels is established.
- Fraction of these results were published in **AIAA: Energy and Propulsion 2021** and presented to **APS-DFD 2020** and **APS-DFD 2021**

SELECTED TALKS

74th Annual Meeting of the Division of Fluid Dynamics Nov 2021

Rodhiya, A., Gruber, A., Chen, J., & Aditya, K. (2021). Effect of fuel-blend ratio in methane-hydrogen reheat flames. Bulletin of the American Physical Society, 66.

73th Annual Meeting of the Division of Fluid Dynamics Nov 2020

Rodhiya, A., Aditya, K., Gruber, A., & Chen, J. (2020). Pressure scaling of a reheat flame structure. In APS Division of Fluid Dynamics Meeting Abstracts (pp. P03-004).

ADVANCED COURSES

- Burgers Program Summer School on Turbulence, University of Maryland Jun 2024
- International Combustion Institute Summer School (ICISS) on Near-Wall Reactive Flows, Technical University of Darmstadt (Virtual event) Jun 2021
- SERC (Supercomputer Education and Research Centre) workshop on Introduction to High-Performance Computing, IISc Bangalore, India Sept 2019

RESEARCH SKILLS

- Parallel programming in Fortran, C, C++, Python and serial programming in Matlab.
- Distributed parallel programming using Message Passing Interface (MPI) and OpenMP.
- Performed massively parallel simulations in Greene (NYU), Stampede3 (TACC, Texas A&M), SahasraT (IISc, India), Cori (NERSC, USA), and FRAM (SINTEF, Norway).

- Data Visualisation using Visit, Para View and also developed Python scripts for visualization.

TEACHING EXPERIENCE

- Successfully assisted in the course DS289: Numerical Solution to Differential Equations.

ACADEMIC ACHIEVEMENTS

- Secured rank under the top 1.22 percentile in Graduate Aptitude Test Engineering 2019 in Mechanical Engineering.
- Secured a rank below the top 0.9 percentile in the undergraduate program's Joint Entrance Examination (Mains) 2015.