Ganesh Borde

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Education

Cockrell School of Engineering, University of Texas at Austin   *Jan 2023 – Dec2024*
Master of Science in Aerospace Engineering
Courses - Compressible Flow, Viscous Flow, CFD, Dynamics of Turbulent Flow, Applied Numerical Mathematics, Adv Plasma, Combustion, Molecular Gas Dynamics, Computational Methods and Hypersonic Aerodynamics.

Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology   *July 2018 - June 2022*
Bachelor of Technology in Aeronautical Engineering
Courses - Aerodynamics, Fluid Mechanics, Intro to CFD, Python Prog, Thermodynamics, FEA, and Propulsion.

Technical Skills

Applications: Ansys, SolidWorks, Paraview, Catia, Open FOAM, Cantera, Chemkin, HPCC, MPI, Fun 3D, Converge, Star CCM+, VS Code, GIT, SVN, Advance Excel, and MS tools.
Programming Languages: MATLAB, C/C++, Python, Julia, Fortran, and LaTeX.
Operating Systems: Linux OS, Mac-OS, and Windows.

Experience

Research (Thesis) | **University of Texas at Austin, Aerospace Engineering**   *Sep 2023 - Present*
- Worked under the guidance of Dr. Fabrizio Bisetti in Reactive Flow Modeling Laboratory.
- Performed simulations using the finite-difference solver for unsteady, reactive Navier-Stokes equations, utilizing 1,000 SU on TACC (HPC) for MPI-based parallel simulations and developed solver to incorporate new physics.
- Conducted detailed numerical simulations (CFD) of 0D (Cantera), 1D, and cylindrical laminar flames in premixed H_2-O_2 mixtures, focusing on unity Lewis number mixtures to avoid instabilities, across various equivalence ratios and pressures.
- Calculated Markstein number and laminar flame speeds to determine the characteristics of mixtures, which contributes to the analysis of turbulent premixed flames at high Reynolds numbers.

Teaching Assistant | University of Texas at Austin   *June 2023 - Present*
- Differential Calculus, Differential and Integral Calculus for Business, and Lab for Physics.
- Facilitating decision sessions to assist with problem-solving on worksheets and addressing conceptual gaps. Provided personalized assistance during one-on-one office hours to clarify difficulties and enhance overall comprehension.

Research | **University of Texas at Austin, ODEN School**   *July 2024 – Sep 2024*
- Conducted DNS studies on separation in channel flow under Dr. Robert Moser,
- Fourier-Galerkin method in x & z directions and solving 1D time-dependent PDEs in Fourier space.
- Applying divergence-free forcing I.C. to induce separation, with the resulting data aiding in the development of a RANS turbulence model for wall-bounded flows.

Intern | KITE, AMTDC-IIT Madras, Ministry of Heavy Industry, Chennai, India   *March 2022 - July 2022*
- Led the development of an Automatic Pallet Changer (APC), utilizing CAD modeling and FEA simulations.
- Designed the Human-Machine Interface (HMI) for the APC, ensuring seamless integration into CNC systems.
- Worked with cross-functional teams to integrate features that increase the effectiveness of APC operation.

Projects

Plasma Fluid Models for DC Glow Discharges using the Drift-Diffusion Model (FVM). *Dec 2024*

- Studied drift-diffusion models, fundamental to industrial applications like plasma processing and material fabrication.
- Solving coupled equations for electron and ion momentum and second-order ODEs for electric potential.
- Implementing finite volume methods for spatial discretization and semi-implicit schemes for time integration.

Designing a scramjet inlet for shock - lip at low Mach number and verifying by using CFD *May 2022*

- Optimized inlet geometry for maximum pressure ratio using Hypersonic Aerodynamics theory, reducing drag and fuel consumption by employing shock on lip. Modeled the inlet in Catia V5, using a structured meshing.
- Analyzed flow characteristics using Ansys Fluent, focusing on pressure, temperature, and Mach number distribution. Addressed combustion challenges at supersonic speeds with JP-7 hydrocarbons, and achieving minimum ignition temperature i.e. 514.15K of air in combustion chamber.
- Presented at ICES 2022, Accenting fuel efficiency and advancements in high-speed aerodynamics.

Design and analysis of small-scale axial flow pump impeller using CFD *Dec 2021*

- Developed a axial flow pump with helical blade design, analyzing fluid motion for six impeller variations. Identified the optimal design with a 300° wrap angle and parabolic curvature.
- Comprehensive study comparing results of different impeller designs, optimizing the chosen design based on flow characteristics, and pressure/velocity distribution along blade surfaces. Created a 3D model of the impeller using Catia and employed Ansys CFX for analysis of flow characteristics. Application in medical devices.

Competitions

LAKSHYA-2K21, The 15th National Level Technical Symposium – miniature pumps *Dec 2021*

- Among the standout projects in the School of Mechanical Engineering, secured a place among the top 10 selections to present.
- Gained valuable insights and feedback from respected committee members, enhancing the project's development.