Ashish Arote

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Professional Summary

- Efficient in project management with extensive CFD experience and successfully concluded more than six thermo-fluid dynamics related projects.
- Experienced in leading a group of engineers resulting in more than 10 research publications.
- Handled cross-functional collaborations with international research groups to resolve complex thermal and fluid engineering problems generating atleast 20% more accurate and efficient CFD algorithms.

Education

National institute of Technology, Surat July 2017 – July 2021
Ph.D. *in Mechanical Engineering*

Walchand College of Engineering Sangli July 2013 – August 2015
M.Tech *in Heat-Power Engineering*

Pune University July 2007 – August 2011
B.E. *in Mechanical Engineering*

Key Projects Handled

CFD simulations of microscopic metal solidification process November 2021 – Present
NEXTA Research Centre, Shimane University *Matsue, Shimane, Japan*

- Developed accurate and efficient CFD algorithm based on cellular automata in C++ to study microscopic liquid metal solidification to capture dendrite growth.
- The natural and forced convection around the solidified metal was also simulated to understand the transport phenomenon. This required parallelization of the CFD code using CPU/GPU through OpenMP/OpenACC API.
- Thermal management: Temperature field was simulated around the moving laser heat source using the parallel and efficient in-house CFD codes. These results were used to optimise the cooling process necessary for obtaining uniform dendrite growth in melt zone.

CFD simulations of oscillating liquid jets July 2019 – June 2021
National Institute of Technology *Surat, Gujarat, India*

- Direct numerical simulations of the oscillating liquid jet were performed using in-house CFD codes to reveal instability within the liquid jet.
- Simulations are performed to understand air-water mixing when oscillating jet develops. The POD and DMD modes are also identified for machine leaning applications.
- Twin oscillating jets are simulated to understand their interaction, atomization and instability at different viscous forces.

Development of improved single phase and multiphase CFD codes July 2017 – June 2019
National Institute of Technology *Surat, Gujarat, India*

- High-resolution and efficient advection schemes are developed and analysed for incompressible Navier-Stokes based solver.
- Accurate, robust and computationally efficient Volume of Fluid based method is developed for multiphase applications. This method is better than the existing multiphase methods used by the commercial CFD softwares.
- Stability regions for different spatial and temporal schemes are analysed using Von Neumann analysis. These C++ codes are parallelized using CPU/GPU through OpenMP, MPI and OpenACC with Python scripting.
- The test cases such as Rayleigh-Taylor instability, Dam-break and Droplet impact are simulated using ANSYS Fluent, OpenFOAM and STAR CCM+. The in-house code is found to be efficient and accurate as compared to the existing methods in software packages.

Development and analysis of programmable CRDI research engine July 2014 – August 2015
Apex Innovations Pvt. Ltd. *Sangli, Maharashtra, India*

- Developed a CRDI research engine with a programmable ECU capable to control and monitor fuel injection and exhaust gas.
- Performance analysis of CRDI engine for varying fuel injection pressures and EGR rates.
- Performance was also analysed for different piston geometries to promote air-fuel mixing.

Experience

Senior Research Associate November 2021 – Present
NEXTA Research Centre, Shimane University *Matsue, Shimane, Japan*

- Develop efficient CFD codes to simulate microscopic metal alloy solidification.
- Lead two teams with ten researchers to carryout the thermo-fluid CFD projects.
- Communicate the scientific findings and updates to the project head.
- Establish and maintain the proper CFD process throughout the project across all teams.

Senior Research Fellow July 2019 – June 2021
National Institute of Technology *Surat, Gujarat, India*

Junior Research Fellow July 2017 – June 2019
National Institute of Technology *Surat, Gujarat, India*

- Develop efficient CFD codes to simulate single and multiphase (gas-liquid) flows.
- Analyse the development of the oscillating liquid jets and their interactions with surrounding fluid.
- Communicate the scientific findings and updates to the scientific journals.
- Worked as a teaching assistant for subjects like advanced fluid dynamics, computational fluid dynamics, refrigeration and air-conditioning etc.

Assistant Professor August 2015 – July 2017
Mechanical Engg. Dept., Sanjivani College of Engineering *Kopargaon, Maharashtra, India*

- Train and guide undergraduate students in their academic projects based on CFD using ANSYS Fluent and STAR-CCM packages.
- Led team of 8 students in various automotive competitions like SAE BAJA, Golf Kart and ATVC

Production Supervisor August 2011 – August 2013
Production Dept., S V HiTech Pvt. Ltd. *Sinnar, Maharashtra, India*

- Supervise the manufactured products and handle the floor work plan.

Scientific Publications

Link: *https://scholar.google.co.in/citations?user=Rn323ZgAAAAJ&hl=en*

Accomplishments

- My research article "On coherent structures of spatially oscillating planar liquid jet developing in a quiescent atmosphere" was selected as Editor's Pick in the journal Physics of Fluids.
- Successfully setup CFD framework for microscopic alloy solidification simulations at NEXTA, Japan during my post-doctoral tenure.
- Developed an improved VOF based multiphase CFD code and was used to reveal the physical behaviour of oscillating liquid jets.
- Worked as a reviewer for international journals like Physics of Fluids, Numerical Heat Transfer: Fundamentals and Numerical Methods in Fluids.

Technical Skills

CFD Packages: ANSYS Fluent, STAR-CCM+, OpenFOAM, Gerris, Basilisk
Post-Processing packages: Paraview, Tecplot 360, GNUPLOT
HPC API: OpenMP, MPI, OpenACC
Programming Languages: C++, Octave, MATLAB, Python

Extra-curricular Activities

- Guest lectured on Fundamentals of CFD at JSPM college of engineering, Pune.
- I represented my school and degree college in Table-tennis and Cricket tournaments.