

# RESUME

## ATUL KUMAR VERMA

Address: Shahjahanpur, Uttar Pradesh, India

E-mail: [atulntssp@gmail.com](mailto:atulntssp@gmail.com)

[atul.20mt0096@mech.iitism.ac.in](mailto:atul.20mt0096@mech.iitism.ac.in)

Phone: +918081115272

Date of Birth 24Aug, 1997

### Skills:

- **Beginner** : MATLAB, OPENFOAM, C++, FORTRAN, Python
- **Intermediate**: FLUIDYN-MP, ANSYS Fluent, Tecplot, Latex

### Interests:

- Interesting subjects: Fluid Dynamics, Thermodynamics, Heat Transfer, CFD.
- Research Interests: Computational Fluid Dynamics, Turbulent Flows and Instability, Direct Numerical Simulation (DNS) of Fluid Flows, High Performance Computing (HPC).

### Qualifications:

DEGREE	COLLEGE/UNIVERSITY	YEAR	PERCENTAGE/CGPA
M.Tech (Thermal Specialization)	Indian Institute of Technology (Indian school of Mines), Dhanbad, India	2020-2022	8.4 till 3 <sup>rd</sup> Semester
B.Tech (Mech. Engineering.)	Government Engineering College, Azamgarh U.P	2015-2019	70.68%
Senior Secondary Examination	O.C.F Inter College Shahjahanpur (Uttar Pradesh Board)	2013-2014	81.4% (School Topper)
Secondary Examination	O.C.F Inter College Shahjahanpur (Uttar Pradesh Board)	2011-2012	81.1% (School Topper)

PG Thesis (On Going)

**Role of thermal stratifications in free shear flows:  
Combined KH-RT instability**

**Guide: Dr. Aditi Sengupta**

Rayleigh-Taylor instability is one of the most common events occurring in the physical world. RTI is of very small Mach number event. We (my guide & I) are interested in seeing how 3D RTI evolves with thermally stratified fluids. How the mixing layer formed with time. We also intend to see the effect of incorporating Kelvin-Helmholtz instability in RTI.

Three-dimensional direct numerical simulations (DNS) of Rayleigh-Taylor instability (RTI) at the interface of two masses of air are performed by solving the compressible Navier-Stokes equation. The effect of thermal gradients on the RTI is explored by considering two temperature differences,  $\Delta T = 21.75\text{K}$  and  $46.5\text{K}$ . The flow is studied in an isolated box with no-slip walls along the three directions. A non-conducting interface, initially separating the two air masses, is impulsively removed at the onset of the numerical experiment. The stages in the evolution of the RTI are explored via the enstrophy transport equation (ETE). The contributions from vortex stretching, viscous diffusion and dissipation are quantified for different thermal gradients, showing completely different dynamics. For low  $\Delta T$ , two interpenetrating rows of bubbles are noted. At higher  $\Delta T$ , an alternating row of bubbles and spikes are noted with a 19% rise in the growth rate of the mixing layer.

Following are my works performed while doing project:

- I intend to use direct numerical simulation on pure 3D RTI and combined 3D KHRTI.
- As resolving all the scale, we need high computing power. For that matter I used High Performance Computing (HPC) facility named Aryabhata available at IIT ISM Dhanbad.
- I made some modifications like dimensions of domain, mesh points, boundary conditions etc. for in-house DNS solver code written in FORTRAN to carry out my simulation.
- When HPC generated enough solution files, I post process the data using visualization software **Tecplot**.

UG Thesis

**Modeling and analysis of reconfigurable wheel track on India terrain**

**Guide: Mr. Pankaj Yadav**

- The main focus was on the development of the project in such a way that it could be used in different terrains (such as plain metaled road, deserted road etc.) and the study is done for the Indian road and environmental conditions.
- Each component of the main design such as small wheel, strips, rim plate, bolts, rollers, dampers etc. have been drafted and modeled on Solidworks individually. Then assembly is again done on the Solidworks.

- After this, the analysis is performed on ANSYS which gives results on various grounds like von misses stress (equivalent stress), total deformation and maximum principal Stress.

---

#### **Publications:**

- Dynamics of unstable thermally stratified flows: Nonlinear enstrophy transport in Rayleigh-Taylor instability: Submitted to the Journal of Physical Review E (PRE) and currently it is under review.

---

#### **Internship & Training:**

- Short term workshop/ training on **Fluidyn MP** at IIT ISM Dhanbad (24May 2021 to 4June 2021) – topics covered were Introduction to **Fluidyn MP** & its tools, geometry & mesh creation, case setup & post processing, introduction to CAE CAD.
- Industrial training at BHARAT HEAVY ELECTRICALS LIMITED, HARIDWAR (09-06-2018 to 08-07-2018). The area of training was exposure of various machines, tools and applications.

---

#### **Achievements:**

- Honored with “The All India Essay Writing Event 2011” Organized by “United Nations Information Centre for India and Bhutan(UNIC) and Shri Ram Chandra Mission(SRCM).
- Participated in “Entrepreneurship Awareness Camp” Sponsored by TEQIP-3 at Government Engineering College, Azamgarh.
- Two Times GATE qualified.
- Undergone a course of study on computers under ICT@Schools Project of Department of Secondary Education, Govt. of Uttar Pradesh.