

Kumar Saurabh

Member Technical Staff at SankhyaSutra Labs

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Education

- **Indian Institute of Technology Madras** Chennai, India
M.Tech Industrial Mathematics and Scientific Computing 2014 - 2016
 - DAAD Exchange Student at RWTH Aachen, Germany
 - Graduated with DGPA 9.50 (Class Rank 1)
 - Thesis: *Analysis and Implementation of Asynchronous Finite Difference Scheme for Advection Diffusion Equation.*
- **Indian Institute of Technology (BHU)** Varanasi, India
B.Tech Chemical Engineering 2010 - 2014
 - Graduated with First Class with Honours, DGPA 8.31

Publications

- Purva Goel, **Kumar Saurabh**, Veena Patil-Shinde and Sanjeev Tambe. “Prediction of API Gravity of Crude Oils using SARA Analysis: Computational Intelligence based Models.” Society of Petroleum Engineering.
- **Kumar Saurabh**. “Implementation of Asynchronous Scheme on Parallel Frameworks using MPI.” 18th AeSI Annual CFD Symposium, NAL Bangalore, 2016.

Work Experience

- **SankhyaSutra Labs Pvt. Ltd** Bengaluru, India
Member Technical Staff June, 2016 - Present
 - RANS Simulations for Flow Past an Aircraft
 - Used $k - \omega$ SST model to perform the simulations.
 - Computed the forces and moments on the aircraft and Hinge Moments as well.
 - Performed analysis of CFD data to suggest design optimization.
 - Develop In-house General Purpose parallel DSMC code
 - Used BCC Grid for efficient sampling of particles during collision.
 - Validated the code with standard test cases such as Thermal Creep, Shock Tubes, etc.

Research Projects

- **Asynchronous Finite Difference Scheme for Partial Difference Equations**
Guide: Prof. Dr. Martin Frank, Math CCES, RWTH Aachen Oct., 2015 - June, 2016
 - Conceptualized a parallel second Order Accurate Asynchronous Tolerant (AT) scheme for Advection Diffusion Equation.
 - Observed a greater speed up when the processor is distributed across the nodes as compared to same within the same for memory intensive codes.
 - MPI Put/Get performs better than MPI ISend/IRecv in terms of statistical delay.

- **Artificial Intelligence formalisms for Modelling of Chemical Systems**

Guide: Dr. Sanjeev Tambe, National Chemical Lab, Pune, India

May, 2013 - July, 2013

- Worked on Estimation of API Gravity based on SARA fraction of oil.
- Implemented Genetic Programming (GP), Artificial Neural Network (ANN) and Support Vector Regression (SVR) techniques for modelling the API Gravity.
- Steiger's Z-test was performed for comparing the prediction and generalization performance of these models.
- RapidMiner package was used for the study.

Mini Projects

- **Non-linear Partial Difference Equation Solver**

Guide: Dr. S. Sundar, Dept. of Mathematics, IIT Madras

Winter 2014

- Implemented the Fast Iterative Krylov Subspace Method along with Pre-conditioners in C++ to solve the system of equation $AX = B$.
- Outer Iteration was performed using Newton - Raphson Method.

- **Mesh Free Solution to the Flow Problem**

Guide: Dr. S. Sundar, Dept. of Mathematics, IIT Madras

Winter 2014

- Solved the 2D Poisson problem and 1D shock-tube problem using Finite PointSet Method (FPM).

- **Computational Fluid Dynamics**

Guide: Dr. K. Arul Prakash, Dept. of Applied Mechanics, IIT Madras

Summer 2014

- Applied Finite Difference and Finite Volume Discretization for solving PDEs.
- Implemented Stream Vorticity Approach to simulate the Channel Flow.
- Developed a Matlab code on Volume of Fluids (VOF) Method to track the deforming interface.

- **PDEs based Image Filters**

Guide: Dr. S. Sundar, Dept. of Mathematics, IIT Madras

Summer 2014

- Implemented the Perona-Malik, and Edge Enhanced Diffusion Model in Matlab as a part of Course Project "Mathematical Modelling in Industry".
- Developed an algorithm to automatize the value of contrast parameter in Perona-Malik Model.

Awards, Grants & Honours

DAAD Scholarship at RWTH Aachen Sept. 2015 - March 2016
 Prof. Helmut Neunzert Endowment Prize for best Academic Record in M.Tech 2016
 Institute Merit Prize for best academic performance in 1st year of M. Tech 2016
 Successful completion of Textbook companion Programme funded by FOSSEE project 2012
 Second Prize in Line Following Robot Competition 2011

Skills

- Numerical Methods: FVM, FEM, IsoGeometric Analysis, FPM, FDM, DSMC.
- Languages (Compiled): C++, C, Java
- Languages (Interpreted): Matlab, Python, Scilab.
- Softwares: Fluent, OpenFoam, Salome, Gmsh.
- Libraries: MPI, OpenMP, deal.II
- Visualisation Tools: Visit, ParaView.
- OS: Linux, Windows