RAGHAVENDRA NIMIWAL

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EDUCATION

Birla Institute of Technology and Sciences Pilani Pilani, India
B.E. (Hons.) Chemical Engineering, (GPA: 8.07/10, Major: 8.42/10) Aug 2015 - May 2019

RESEARCH EXPERIENCE

International Center for Theoretical Sciences - TIFR Bangalore, India
Visiting Student under Prof. M. Kulkarni and Prof. V. Vasan Aug 2019 - May 2020

- Generating soliton like initial conditions for non-integrable coupled Nonlinear Schrödinger equation systems.
- Developed a versatile simulation package, which takes in a coupled NLS system of any arbitrary size and derives soliton (traveling wave packet) like initial conditions for the system using Reductive Perturbation method.
- The package is written in C and is parallelized using openMP.
- The package checks the robustness of the generated initial conditions by time evolving them numerically using any of the three numerical schemes- Leap Frog, Crank Nicolson, Rungee Kutta 4th order.
- The package has a post processing and visualizing script written in python. Project Details

Institut de Recherche Dupuy de Lome - CNRS Bretagne, France
Undergraduate Thesis under Prof. M. Arrigoni Jan 2019 - July 2019

- Numerical and Experimental study of laser induced blast waves.
- Analyzed experimental data of micro blast waves induced from pulsed laser (pressure signals from PVDF sensor and high-speed shadowgraphy data for tracking shock wave front).
- Engineered a shutter to control the laser pulse using Arduino.
- Developed a Matlab script to track the wave front from the high-speed shadowgraphy data.
- Developed a theoretical model and validated the experimental results using numerical simulations on Clawpack (open source numerical solver for hyperbolic PDE).

Indian Institute of Technology, Bombay Mumbai, Maharashtra
Research Internship under Prof. R. Dasgupta May 2018 - July 2018

- Parallelized an in-house Multiphase Flow Solver using Message Passing Interface library functions in C.
- Developed a parallel Multigrid Pressure Poisson equation solver for the in-house code.
- Benchmarked the in-house solver with Gerris Flow Solver.

Central Salt and Marine Chemicals Research Institute - CSIR Bhavnagar, Gujarat
Research Internship under Prof. R. K. Nagarale May 2017 - July 2017

- Engineered highly selective Polyaniline and Polyaniline-co-epichlorohydrin anion exchange membranes for acid recovery by diffusion dialysis.
- Created a process for in-situ polymerization of monomers on polypropylene substrate.
- Optimized the membrane preparation process and achieved desired porosity by testing different monomers to achieve high acid recovery rate.

ACADEMIC PROJECTS

2D incompressible Navier-Stokes Solver with Fluid Structure Interaction using Fortran BITS Pilani
Academic project under Prof. K. B. Joshi Jan 2018 - Dec 2018

- Discretized the Navier-Stokes equations using Finite Volume approach on Staggered Grid in Cartesian coordinates.
- Implemented Fractional-Step time stepping scheme and geometric Mutligrid for Pressure Poisson equation.
- The solver could define solid geometries anywhere inside the domain.
- Implemented Immersed Boundary Method cut cell approach to resolve solid boundaries inside the domain which do not align with the grid lines.

Transient Numerical Model for a Biomass Cookstove BITS Pilani

Academic Project under Prof. P. Sheth Jan 2018 - May 2018

- Modelled reaction kinetics of drying, pyrolysis and combustion of biomass in convective flows.
- Mass balance, energy balance and momentum balance were coupled to determine the variation of temperature with height and time which in turn determined the reaction kinetics in the region.

TECHNICAL SKILLS AND BACKGROUND

- Proficient in C and parallel programming using MPI and OpenMP.
- Python, Fortran, C++, Matlab, LaTeX
- Numerical solutions of PDEs using Finite Difference Methods, Finite Volume Methods and Finite Element Methods.
- Relevant coursework: Calculus, Linear Algebra, Differential Equations, Dynamical Systems, Numerical Methods (FDM and FVM), Finite Element Methods, Differential Geometry, Transport Phenomena, Fluid Mechanics, Continuum Mechanics, Heat Transfer, Computer Programming

LEADERSHIP EXPERIENCE

Inspired Karters BAJA BITS Pilani

Design Head and Finance Head Jan 2017 - Dec 2017

- Inspired Karters BAJA is a technical team in BITS Pilani involved in making an off-road vehicle to participate in a student design competition.
- Responsible for systems integration between steering, suspension, braking, power train and structure along with designing the suspension and steering of the car.
- Responsible for scheduling, maintaining manufacturing time-lines and managing finances of 8,00,000 INR for a team of 40 members

Creative Activities Club BITS Pilani

Coordinator Jan 2017 - Dec 2017

- Coordinated the activities of the club which involved organizing various art based events on the campus and creating an environment of teaching and learning so that people involved in drawing, painting and sketching can learn from each other.

ADDITIONAL EXPERIENCE

- Attended ICTP - ICTS Winter School on Quantitative Systems Biology 2019.
- Attended The Physics of Life Online Summer School 2020 organized by Princeton University.

PUBLICATIONS

- Pradeep K. Prajapati, **Raghavendra Nimiwal**, Puyam S. Singh, and Rajaram K. Nagarale. Polyaniline-co-epichlorohydrin nanoporous anion exchange membranes for diffusion dialysis. *Polymer*, 170:168 – 178, 2019
- Pradeep K. Prajapati, Naresh N. Reddy, **Raghavendra Nimiwal**, Puyam S. Singh, S. Adimurthy, and Rajaram K. Nagarale. Polyaniline@porous polypropylene for efficient separation of acid by diffusion dialysis. *Separation and Purification Technology*, 233:115989, 2020

REFERENCES

- Vishal Vasan, International Center for Theoretical Sciences (Email: vishal.vasan@icts.res.in)
- Manas Kulkarni, International Center for Theoretical Sciences (Email: manas.kulkarni@icts.res.in)