Shivam Sahu
Curriculum Vitæ

Gender	Male
Ethnicity	Indian
Address	705 Ivy Street, Apt No. 3, Pittsburgh PA, 15232, USA
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RESEARCH INTERESTS

- Theoretical modelling of conformation and orientation of single polymer chain in dilute solutions.

- Dynamics of single polymer chains in dilute solutions using Brownian Dynamics Simulation

- Hydrodynamic stability analysis of Complex Fluids past deformable surfaces

JOURNAL PAPERS [statistics]

1. S. Sahu and V. Shankar, "Passive manipulation of free-surface instability by deformable solid bilayers", *Phys. Rev. E* **94**, 013111 (2016).

EDUCATION

PhD in Chemical Engineering — 2017-2022[1]
Carnegie Mellon University
Thesis Supervisor:- **Dr. Aditya S. Khair**
- Quality Point Average (QPA):- 4.0 on a scale of 4.0.

MS in Colloids, Polymers and Science — 2017-2019
Carnegie Mellon University
- Quality Point Average (QPA):- 4.0 on a scale of 4.0.

B.Tech-M.Tech Dual Degree in Chemical Engineering — 2012-2017
Indian Institute of Technology, Kanpur
Thesis Supervisor:- **Dr. V. Shankar** and **Dr. Indranil Saha Dalal**
- M.Tech Cumulative Performance Index (CPI):- 9.3 on a scale of 10.0.
- B.Tech Cumulative Performance Index (CPI):- 7.9 on a scale of 10.0.

WORK EXPERIENCE

Graduate Research Assistant - PhD — Aug 2017-Present
Chemical Engineering, Carnegie Mellon University, Pittsburgh PA, USA
- Currently working in theoretical modelling of time-averaged polymer extension in oscillatory extensional fluid flow.
- Presented Poster at 40th Annual CheGSA Research Symposium.
- Completed teaching assistantship for three semesters covering two graduate level course and one undergraduate level course.

Graduate Research Assistant - M.Tech — June 2016-May 2017
Department of Chemical Engineering, IIT Kanpur, Kanpur, U.P., India
- Studied the dynamics of single polyelectrolyte chain in dilute solution using Brownian Dynamics simulation.
- Completed teaching assistantship for two semesters covering graduate and undergraduate level course.

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[1]Expected year of graduation.

MASTER THESIS

Dynamics of Polyelectrolyte chain using Brownian Dynamics simulation   Aug 2016–May 2017
Department of Chemical Engineering, IIT Kanpur, Kanpur, U.P., India
Thesis Supervisor:- **Dr. V. Shankar and Dr. Indranil Saha Dalal**
- Configurational dynamics of isolated polyelectrolyte chain in dilute solution is studied under a simple shear flow.
- Physical effects such as hydrodynamic interaction and excluded volume interaction is analyzed.
- Effect of polyelectrolyte chain confinement is studied as alternative technique to induce anisotropy in the chain. [Thesis]

INTERNSHIPS

First principle based synthesis strategies for NMP reactions   May 2016–July 2016
Laboratory for Chemical Technology, Ghent University, Ghent, Belgium
Project Supervisor:- **Dr. Maarten Sabbe and Dr. Marie F. Reyniers**
- Controlling the occurrence of the hydrogen transfer reactions in a simplified reaction network via ab-initio calculations.
- Simplified reaction network is considered for the NMP of acrylonitrile, styrene, methyl acrylate, and methyl methacrylate. The nitroxides used are TEMPO, SG1, DBN, and a derivative of DPAIO (DPAIO-der).
- The thermodynamic and kinetic parameters in the gas and/or solution phase are obtained via ab-initio calculations. To calculate the free energy of solvation, COSMO-RS is used as screening model for solvent.
- All possible stereoisomers are considered to take into account the role of optically active reactants. Also the NMP is performed on both monomer and dimer radicals of the reaction network. [Report]

Mesoscale modelling of Advection-Diffusion Equation via LBM   May 2015–June 2015
Engineering Mechanics Unit, JNCASR Bangalore, Bangalore, Karnataka, India
Project Supervisor:- **Dr. S. Ansumali**
- A corollary is been derived for the advection-diffusion equation with the use of boltzmann equation and then the usual lattice based technique is applied to model the above equation.
- Keeping stability analysis in mind, an impulse is been given as a disturbance to the system and the dynamics of the impulse were observed with simulation time. The numerical codes were written in C++ and the numerical results were found to be in excellent agreement with the analytical solution.
- A D3Q15 lattice model is first been used to model the equation involving a three-dimensional regular grid. Moreover, to enhance the computational stability and convergence of the code, a replica grid is also been introduced in this problem, which seems to be the efficient choice for the numerical stability of the simulation.
- Parallel computing techniques is also been implemented to enhance the convergence limit of the code. An open-MPI parallelizing scheme is successfully implemented and the convergence is attained at relatively much faster rate. [Report]

Passive Manipulation of free-surface instability by solid bilayers   May 2014–July 2014
Department of Chemical Engineering, IIT Kanpur, Kanpur, U.P., India
Project Supervisor:- **Dr. V. Shankar**
- Achieved the suppression of the free-surface instability using a solid bilayer modelled as linear viscoelastic solid.
- A long wave (asymptotic) analysis is been performed onto the tri-layered system to obtain the behavior of the system at low wave number regime.
- A shooting code has been developed which solves the linear fourth order ODE (Orr-Sommerfeld equation) along with the fluid-solid coupled interfacial conditions in order to continue the nature of the disturbance at finite wave number regime.
- The results were compiled, drafted into a research paper, and is published in the journal Physical Review E. [Report]

RELEVANT COURSES

Graduate Level Courses: Mathematical Techniques in Chemical Engineering, Advanced Thermodynamics, Advanced Fluid dynamics, Advanced Heat and Mass Transfer, Transport Phenomenon, Introduction to Hydrodynamic Stability, Structure and Rheology of Complex Fluids, Physical Chemistry of Macromolecules, Physical Chemistry of Colloids and Science, Colloids, Polymers and Surfaces Labs - I & II, Introduction to Finite Element Methods, Molecular Modelling in Chemistry, Mathematical Methods in Chemical Engineering.

Under-Graduate Level Courses: Fluid Mechanics, Introduction to Molecular Simulation, Process Dynamics and Control, Chemical Engineering Design, Chemical Reaction Engineering, Heat Transfer and its Applications, Chemical Engineering Thermodynamics, Unit Operations Laboratory – I & II, Mass Transfer and its Applications.

TECHNICAL AND PERSONAL SKILLS

- **Programming Languages:**
  - Proficient in: C, C++, TeX
  - Basic ability with: Python, JAVA

- **Industry Software Skills:**
  - Advanced Level: MATLAB, MATHEMATICA
  - Intermediate Level: COMSOL, SIMULINK

- **Platform:** Windows, Linux

- **Data Handling Skills:** Origin, MS Excel, GNUPlot, XMGrace

- **General Communication Skills:** Good presentation and teaching skills, Works well in a group.

- **Interpersonal Skills:** Undertook TA Office hours for three semesters for 20+ graduate students, Mentored 30+ undergraduate students for Unit Operations lab course.

- **Languages:**
  - Proficient in: English, Hindi
  - Basic ability with: German

SCHOLARSHIP AND CERTIFICATES

Exxon Mobil Graduate Fellowship   2017–2018
Awarded the Exxon Mobil Graduate Fellowship in Chemical Engineering for the 2017 academic year; Got selected from a class of 30+ student.

Teaching Assistant Grant   June 2016–May 2017
Awarded the teaching assistant grant for being the tutor of undergraduate and graduate level courses.

Merit-Cum-Means Scholarship   July 2012–Apr 2016
Awarded the scholarship for meritorious undergraduate students facing financial challenges during the complete period of undergraduate studies.

Graduate Record Examination GRE ®   Nov 2016
GRE Score: 323/340 (Q:166/170; V:157/170) AWA: 3.5/6.0

Test of English as a Foreign Language TOEFL ®   Nov 2016
TOEFL Score: 103/120 (S:24/30; L:27/30; R:27/30; W:25/30)

EXTRACURRICULAR ACTIVITIES

Future Faculty Program   Aug 2018–Present
Enrolled in the future faculty program to develop and enhance teaching skills required for a faculty career.

Safezone CMU Trained
Developed interpersonal skills to provide a safe and conducive environment for LGBTQ+ members within CMU.