Shivangi Mittal

Female

DOB: 26/04/1997

LAOS Rheology

EDUCATIONAL QUALIFICATIONS			
Ph.D., Chemical Engineering	IIT Kanpur	8.75/10	2019 – Present
B.Tech, Chemical Engineering	MNIT Jaipur	8.26/10	2015 – 2019
Class XII, CBSE	D.P.S Ghaziabad, Vasundhara	94.80%	2015
Class X, CBSE	D.P.S Ghaziabad, Vasundhara	10/10	2013

AWARDS AND SCHOLARSHIPS		
Scholarships	**Fulbright Nehru Doctoral Research Fellowship**	Aug 2023-May 2024
	Awarded by the United States India Education Foundation to academics to study and research in a US based host institution for a duration of 6-9 months	
	Prime Minister Research Fellowship (PMRF)	Jan 2021– present
	Awarded by the Government of India to about 1000 Ph.D. students for upto 5 years	
	Uttar Pradesh Kanya Vidya Dhan Yoajana	2016
	Awarded by Government of Uttar Pradesh for passing with distinction in Class 12th CBSE	
Awards	▪ Awarded "Outstanding performance in GATE 2019" by TEQUIP 3-MNIT ▪ Lauded for being a meritorious student for 4 consecutive years with a scholar's batch and a blue blazer awarded by DPS Gaziabad ▪ Won a medal for being a school topper in International Mathematics Olympiad	2019 2013 2010 & 2011

PROJECTS & RESEARCH PAPERS		
Research papers	▪ Shanbhag, S., Mittal, S. and Joshi, Y.M., 2021. Spectral method for time-strain separable integral constitutive models in oscillatory shear. *Physics of Fluids*, *33*(11), p.113104.	
Ph.D. Projects (Supervisors: Prof. Yogesh Joshi & Prof. Sachin Shanbhag)	**Time strain separable integral constitutive equations in oscillatory shear**	
	▪ Developed a spectral method to simplify tssKBKZ integral in terms of linear viscoelastic moduli ▪ Obtained an analytical solution for large amplitude oscillatory shear (LAOS) response of the tssKBKZ model, which is a linear combination of linear viscoelastic moduli ▪ Presented complete LAOS responses of tss constitutive models-Doi-Edward, MSF, multimode Maxwell etc. ▪ Discussion on partial time strain separability of Giesekus and Pom-Pom models. ▪ Algorithm to extract the damping function and hence, all the parameters of tssKBKZ equation from oscillatory shear data, rather than stress relaxation experiments..	
	The harmonic balance for oscillatory shear response of differential constitutive models	
	▪ Harmonic Balance (HB) converts the the initial value problem of differential constitutive models to a periodic boundary value problem. ▪ It can handle any constitutive relation with any kind of nonlinearity subjected to LAOS deformation. ▪ Implement the Harmonic Balance technique for Giesekus model with quadratic nonlinearity ▪ Extend this method to other differential models with different types of nonlinearities using the Alternating Frequency Time approach.	
	Validity and limitations of the Power series for oscillatory shear flow	
	▪ Investigate model aging systems for oscillatory response in linear small amplitude region ▪ Use the Maxwell and Giesekus model to demonstrate this ▪ Explore the effects of aging exponent on material response and power law scaling	
	Linear viscoelasticity and thixotropy through the lens of wavelet transform	
	▪ Understand linear viscoelastic behaviour of standard spring-dashpot models in terms of wavelet transform. ▪ Analyse oscillatory behaviour of standard models that show shear thinning and thickening by wavelets ▪ Associate different wavelets with different relaxation phenomena ▪ Apply wavelet transform for thixotropic model system ▪ Use these concepts to under delayed solidification phenomena	
Academic Projects	**CFD simulation of low Reynolds no. flow of power law fluids over two square cylinders in tandem**	*Nov '19 – Dec '19*
	▪ Worked on a project as a part of course requirement taken by Prof. Indranil Saha Dalal ▪ Performed CFD simulations using COMSOL to simulate the effect of power law exponent and the L/d ratio of the tandem assembly	
	Application of ternary organic acid mixture as a Phase Change Material (PCM) in building applications	*Aug'18 – May'19*
	▪ B.Tech final year project guided by Prof. Madhu Agarwal at MNIT Jaipur ▪ Investigated the efficiency of a ternary mixture of capric, lauric and palmitic acid as PCM. ▪ The applicability of the material was established by its ability to reduce the rate of overall heat transfer	

	Application of modified GACs by adsorption and reactive adsorption for caffeine removal	*May'17 – May'19*
	▪ Worked under Prof. R.K. Vyas as an undergraduate research student ▪ Successfully employed modified GACs for removing 99% caffeine ▪ Proposed a reaction mechanism and substantiated with a mathematical model	

TEACHING

Instructor	▪ Administered "Chemical Engineering Fluid Mechanics" course in Department of Chemical Engineering, AITH Kanpur ▪ Administered "Introduction to Fluid Mechanics" course in the Department of Food Technology, HBTU Kanpur	*Sept '22 – Nov '22* *Sept '21 – May '22*
Teaching Assistant	▪ Volunteer TA for "Structure and Rheology of Complex Fluids" course at IIT Kanpur ▪ TA for "Process Dynamics and Control" course at IIT Kanpur ▪ TA for "Computational Methods in Engineering" course at IIT Kanpur	*Aug '21 – Dec '21* *Jan '20 – May '20* *Aug '19 – Dec '19*

INTERNSHIPS

Engineers India Limited (HO), New Delhi	Graduate trainee	*May '18 – Jul '18*
▪ Vocational training in the Process Department of EIL and familiarized with the functioning of Naptha Hydrotreating Unit. ▪ Worked on vessel sizing, pipe hydraulic design and pump calculations ▪ Simulated a refrigerant system for NHT unit		
Star Paper Mills Ltd, Saharanpur	Vocational Trainee	*Jun '17 – Jul '17*
▪ Undertook summer training in the Pulp Mill and understood the working of Pulp and Paper Manufacturing Plant		

TECHNICAL SKILLS

- Software Packages: MATLAB, COMSOL, Aspen Plus, Aspen HYSYS, Microsoft Office
- Documentation and calculation tools: LaTeX, MathType, Mathematica
- Language: English, German

MEMBERSHIPS

▪ Regular three year member of the international organisation "Society of Rheology" ▪ Student member of "The Indian Institute of Chemical Engineers"	2022–2025 2016-2019

POSITIONS OF RESPONSIBILITY

Registration Secretary, MST	*Nov '17 – Feb '18*
▪ Catered to registration and accommodation needs of almost 1000 participants at MST	MNIT Jaipur
Coordinator, MST	*Nov '16 – Feb '17*
▪ Administered the arrangements and logistics for MST	MNIT Jaipur
Editor, AluMNITimes Magazine	*Sept '16 – Dec '16*
▪ Wrote articles, translated and compiled content for the magazine	MNIT Jaipur

EXTRA-CURRICULAR ACTIVITIES

Device fabrication	▪ Designed a device to streamline the inlet turbulent flow for 'Laminar' challenge in SPHINX 2018, NIT Jaipur ▪ Designed a counter-current shell and tube heat exchanger wit for a competition in SPHINX 2018, NIT Jaipur ▪ Designed a viscometer for Newtonian liquids for "Viscometer" challenge during Blitzschlag 2017, NIT Jaipur
Cultural Events	▪ Participated in Mock Parliament event and represented the state of Odisha at MNIT Jaipur in 2017 ▪ Bagged2nd position in dramatics competition 'Tamasha' in the techno-cultural festival Blitschlag 2016

REFERENCES

Dr. Yogesh M Joshi Professor Department of Chemical Engineering Indian Institute of Technology Kanpur Email: joshi@iitk.ac.in	Dr. Sachin Shanbhag Professor Department of Scientific Computing Department of Chemical & Biomedical Engineering Email: sshanbhag@fsu.edu

CONTACT

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