

# ABHILASH R. MALIPEDDI

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## EDUCATION

**The George Washington University**, Washington, D.C., USA

*Ph.D., Mechanical Engineering*

2021

Dissertation: "Rheology, diffusion and micro-structure of sheared suspensions of deformable particles"

Advisor: Kausik Sarkar

**Indian Institute of Technology Madras**, Chennai, India

*Master of Technology, Mechanical Engineering Specialization in Energy Technology* 2011

Thesis: "Influence of duct geometry on the performance of Darrieus turbine"

Advisor: Dhiman Chatterjee

**Indian Institute of Technology Madras**, Chennai, India

*Bachelor of Technology, Mechanical Engineering*

2011

## PUBLICATIONS

1. **Abhilash Reddy Malipeddi** and Kausik Sarkar. Shear-induced diffusivity of a red blood cell suspension: effects of cell dynamics, *Soft Matter*, 2021.
2. **Abhilash Reddy Malipeddi** and Kausik Sarkar. Collective diffusivity in a sheared viscous emulsion: Effects of viscosity ratio. *Physical Review Fluids*, 4(9), 093603, 2019
3. **Abhilash Reddy Malipeddi** and Kausik Sarkar. Shear-induced collective diffusivity down a concentration gradient in a viscous emulsion of drops. *Journal of Fluid Mechanics*, 868:5–25, 2019.
4. Sagnik Singha, **Abhilash Reddy Malipeddi**, Mauricio Zurita-Gotor, Kausik Sarkar, Kevin Shen, Michael Loewenberg, Kalman B. Migler, and Jerzy Blawdziewicz. Mechanisms of spontaneous chain formation and subsequent microstructural evolution in shear-driven strongly confined drop monolayers. *Soft Matter*, 15(24):4873–4889, 2019.
5. Priyesh Srivastava, **Abhilash Reddy Malipeddi**, and Kausik Sarkar. Steady shear rheology of a viscous emulsion in the presence of finite inertia at moderate volume fractions: Sign reversal of normal stress differences. *Journal of Fluid Mechanics*, 805:494–522, 2016.
6. **Abhilash Reddy Malipeddi** and Dhiman Chatterjee. Influence of duct geometry on the performance of Darrieus hydro turbine. *Renewable Energy*, 43:292–300, 2012.  
*(in prep.)*
7. **Abhilash Reddy Malipeddi**, Anik Tarafder and Kausik Sarkar. Deformation characteristics and breakup of a viscoelastic drop in time-periodic extensional flows.
8. Anik Tarafder, **Abhilash Reddy Malipeddi** and Kausik Sarkar. Effect of matrix viscoelasticity on the hydrodynamic interaction between pairs of viscous drops in free shear

## HONORS & AWARDS

- ▶ Outstanding Accomplishment in Research awarded by Office of Vice President for Research, The George Washington University 2015
- ▶ Travel Award by APS to present at the APS Physics Canada-America-Mexico Conference in Oaxaca, Mexico 2015
- ▶ GW Fellowship *(multiple)*
- ▶ The MCM Scholarship awarded by Indian Institute of Technology Madras 2010

- PROFESSIONAL EXPERIENCE**
- The George Washington University** Washington, D.C., USA  
*Research Assistant* SEPTEMBER 2013—PRESENT
- Developed scalable parallel Fortran/MPI code to simulate flows of complex multi-specie multi-particle suspensions
  - Implemented cell mechanics models using a front tracking framework
  - Implemented non-conforming rigid boundaries using direct immersed boundary method
  - Calculated shear induced gradient diffusivity of drops and cells from simulations
- NTPC Limited** Chennai & Ramagundam, India  
*Assistant Manager (Operation, Commissioning)* AUGUST 2011—JULY 2013
- Commissioned thermal power generation stations (VTPS Units 1 & 2 )
  - Led 10+ personnel in safe operation of a 500MW power generation unit
  - Applied ML tools to solve process issues e.g. clinker formation in the furnace
- Indian Institute of Sciences** Bangalore, India  
*Intern (Force Microscopy Lab)* SUMMER 2008
- Designed sample holder for Transmission Electron Microscope *in-situ* nano-indenter.
- TEACHING EXPERIENCE**
- Graduate Teaching Assistant, *Mechanical and Aerospace Engineering*
- |   |             |
|---|-------------|
| MAE 3166W: Materials Science & Engineering, (Writing G. A.) | FALL 2017   |
| MAE 6229: Propulsion  | SPRING 2016 |
| APSC 6213: Analytical Methods in Engineering III: PDEs      | FALL 2016   |
- PROFESSIONAL SKILLS**
- ▶ Demonstrated knowledge of distributed computing and linux administration
  - ▶ Parallel programming experience in Fortran, C, C++, Python, Julia
  - ▶ High performance computing technologies: MPI, OpenMP, GPU, Cuda
  - ▶ Familiarity with hypre, PetSc, Trilinos and other HPC libraries
  - ▶ Data science libraries: SciPy, Numpy, Pandas, scikit-learn, Keras, PyTorch
- GRANTS**
- Contributed to:
1. Extreme Science and Engineering Discovery Environment (XSEDE) research allocation grant, 2019. PI: Kausik Sarkar, "Rheology, diffusion and micro-structural evolution of emulsions of complex fluids", Grant # CTS180042 Renewal, Award value: **\$16,682.00**
  2. Extreme Science and Engineering Discovery Environment (XSEDE) research allocation grant, 2018. PI: Kausik Sarkar, "Rheology, diffusion and micro-structural evolution of emulsions", Grant # CTS180042 New, Award value: **\$16,588.67**
  3. Extreme Science and Engineering Discovery Environment (XSEDE) startup allocation grant, 2017. PI: Kausik Sarkar, "Rheology of emulsions in the presence of inertia", Grant # CTS170042, Award value: **\$1841.00**
- CONFERENCE TALKS**
1. APS Division of Fluid Dynamics Conference 2019, Seattle, Washington, "Shear induced gradient diffusivity of red blood cell suspensions"
  2. Burgers Symposium 2019, Johns Hopkins University, Baltimore, "Shear-induced diffusion of deformable particles using dynamic structure factor"
  3. APS March Meeting 2018, Los Angeles, California, "Shear-induced gradient diffusivity of emulsions at finite inertia"
  4. Burgers Symposium 2018, The George Washington University, "Hydrodynamic collective diffusion in emulsions under shear flow"

5. APS Division of Fluid Dynamics Conference 2017, Denver, Colorado, "Shear-induced gradient diffusivity in emulsions"
6. Northeast Regional Soft Matter Workshop, 2017, Princeton University, "Computation of shear-induced collective diffusivity in emulsions"
7. Burgers Symposium 2016, Johns Hopkins University, Baltimore, "Computation of viscoelastic drop deformation in periodic planar extensional flows"
8. APS Physics Canada-America-Mexico Conference 2015, Oaxaca, Mexico, "Effects of a fluid filament's curvature on its stability"
9. Society of Rheology 87th Annual Conference 2015, Baltimore, "Deformation of a viscoelastic drop in periodic planar extensional flows"

POSTER  
PRESENTATIONS

1. SEAS R&D Showcase 2019, "Shear induced gradient diffusivity of red blood cell suspensions"
2. SEAS R&D Showcase 2018, "Computation of collective diffusivity in emulsions at finite inertia"
3. SEAS R&D Showcase 2017, "Flow induced diffusion of deformable particles"
4. GWU Research Days 2015, "Deformation characteristics of a viscoelastic drop in periodic plane extensional flows" (Award Winner)
5. SEAS R&D Showcase 2015, "Dynamics of a viscoelastic drop in time-periodic flows"

PROFESSIONAL  
AFFILIATIONS

Member APS, SOR, SIAM

2015–

PROFESSIONAL  
SERVICE

Reviewer  
- Journal of Fluids Engineering

OUTREACH  
ACTIVITIES

2016 AIAA-National Capital Section Judge at DC STEM fair.

ACTIVITIES &  
INTERESTS

Physical Computing, Computational Geometry, Science Outreach, Mechanical Design