# Dr. Akanksha Gupta

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**Contact Information & Personal Details:**


- **Designation:**
  Assistant Professor
- **Affiliation:**
  Maulana Azad National Institute of Technology,
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  Madhya Pradesh, India 462003, India.
- **Google Scholar:** click here
- **E-Mail:** akanksha@manit.ac.in
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- **Mobile:** +91 9106843202
- **Nationality :** Indian
- **Sex :** Female
- **Marital status:** Married


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**Research Experience:**

- **National Postdoctoral fellow**, Indian Institute of Science, CV Raman Rd, Bengaluru, Karnataka 560012, India.
  [08 march, 2022 - 07 march, 2024]
- **Postdoctoral fellow**, Institute for Plasma Research, Bhat, Gandhinagar-382428, Gujarat, India.
  [8 Oct, 2021 - 04 March, 2022]
- **Postdoctoral fellow**, Indian Institute of Technology Kanpur, Kanpur-208016, Uttar Pradesh, India.
  [4 Sept, 2018- 15 June, 2020]
- **Senior project engineer,** Indian Institute of Technology Kanpur, Kanpur-208016, Uttar Pradesh, India.
  [2 Dec, 2017- 3 Sept, 2018]
- **Postdoctoral fellow**, Institute for Plasma Research, Bhat, Gandhinagar-382428, Gujarat, India.
  [2 June, 2017- 30 Nov, 2017]

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**Publications in Refereed Journals:**

- *"Can flocking aid the path planning of microswimmers in turbulent flows?"*
  **Akanksha Gupta**, J. K. Alageshan, K. V. Kolluru, and R. Pandit
  Physics of Fluids 37 (045107) (2025) [**Editor's Pick**].
- *"Molecular and hydrodynamic descriptions of shear flows in two-dimensional strongly coupled dusty plasmas"*
  **Akanksha Gupta**
  Reviews of Modern Plasma Physics 21 (6) (2022).
- *"The emergence of inertial waves from coherent vortex source in strongly coupled dusty plasma",*
  **Akanksha Gupta**, and R. Ganesh
  Phys. Plasmas Lett. **27**, 050701 (2020). [**Editor's Pick as cover article**].
- *"Hydrodynamic Turbulence: Sweeping effect and Taylor's hypothesis via correlation function",*
  M. K. Verma, A. Kumar, and **Akanksha Gupta**
  Transactions of the Indian National Academy of Engineering **5**, 649–662(2020).
- *"Energy and enstrophy spectra and fluxes for the inertial-dissipation range of two-dimensional turbulence",*
  **Akanksha Gupta**, R. Jairam, A. G. Chaterjee, S. Shadhukhan, R. Samtaney, and M. K. Verma
  Phys. Rev. E, **100**, 053101 (2019).
- *"Compressibility effects on quasistationary vortex and transient hole patterns through vortex merger",*
  R. Mukherjee, **Akanksha Gupta**, and R. Ganesh
  Physica Scripta, **94**, 115005 (2019).

- *"Viscoelastic effects on asymmetric two-dimensional vortex patterns in a strongly coupled dusty plasma",*
  **Akanksha Gupta**, R. Mukherjee, and R. Ganesh
  Contributions to Plasma Physics, **59**, 8, e201800189, (2019). [**Editor's Pick as cover article**].
- *"Compressible Kolmogorov flow in strongly coupled dusty plasma using molecular dynamics and computational fluid dynamics. II. A comparative study",*
  **Akanksha Gupta**, R. Ganesh and A. Joy
  Phys. Plasmas **25**, 013706 (2018).
- *"Compressible effects on a shear flow in strongly coupled dusty plasma. I. A study using computational fluid dynamics",*
  **Akanksha Gupta**, and R. Ganesh
  Phys. Plasmas **25**, 013705 (2018). [**Editor's Pick**].
- *"Molecular shear heating and vortex dynamics in thermostated two-dimensional Yukawa liquids,*
  **Akanksha Gupta**, R. Ganesh and A. Joy
  Phys. Plasmas **23**, 073706 (2016).
- *"Kolmogorov flow in two-dimensional strongly coupled Yukawa liquid: A molecular dynamics study",*
  **Akanksha Gupta**, R. Ganesh and A. Joy
  Phys. Plasmas, **22**, 103706 (2015).
- *"Kolmogorov flow in two-dimensional strongly coupled dusty plasma",*
  **Akanksha Gupta**, R. Ganesh and A. Joy
  Phys. Plasmas **21**, 073707 (2014).

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**Computational Skills:**

- **Developed codes:**
  1. *MPI* parallel pseudo-spectral and *FFTW* based Advanced Generalised SPECTral Code **(AG-Spect)**.
  2. Magnetostatic fluid solver to study the vortex flow dynamics of viscous and visco-elastic fluids.
  3. Numerical diagnostics to analyse & visualise two dimensional grid data from:
     - Kinetic energy and enstrophy spectra and fluxes.
     - "Passive Tracer Particle" diagnostics.
     - Spectral Probe analysis in turbulent flows.
     - Visualisation of 2D vortex flows.
  4. Eigen value solver for incompressible and compressible viscous and visco-elastic fluids to study parallel shear flow.
  5. Eigen value solver for Rayleigh-Bénard convection cells for various boundaries.
  6. Three dimensional molecular dynamics code.
  7. Viscek's model code for active particles.
  8. **Machine learning:** Q-learning and adversial Q-learning codes.
- **Code Involved in:**
  1. **TARANG**, a pseudospectral code to simulate turbulent flows in fluids, Magnetohydrodynamics (MHD), convection, passive scalar, etc.
  2. **MPMD-2D**, Multi potential molecular dynamics two dimensional code. Developed and benchmarked MPMD code with a new Configurational Thermostat.
  3. **KOLMOGOROV41-** It's a parallel code to compute structure functions for a given velocity or scalar field.
- **Languages:** C, Fortran-95, Python, Matlab, C++
- **Parallel Computing Architectures:** MPI
- **HPC resources used:** Shaheen II at Kaust supercomputing laboratory, Saudi Arabia; HPC-2010 and HPC-2013 at IITK, Kanpur, India; Uday and Udhbhav at IPR, Gandhinagar India; Utkarsh at Bhabha Atomic Research Center (BARC), Mumbai, Maharashtra, India.

**Academic Background:**

- *2011 - 2017:* **Doctor of Philosophy (Physics)**
  Institute for Plasma Research, Gujarat, India
  University: *Homi Bhabha National Institute, BARC Training School Complex, Anushaktinagar, Mumbai, Maharashtra-400094, India*
  Title of Thesis: Shear flows in 2D strongly coupled fluids: A theoretical and computational study.
  Thesis Advisor: *Prof. Rajaraman Ganesh*

- *2007 - 2009:* **Master of Science (Physics)** [**First class**]
  Christ Church College, Kanpur, U.P, India
  University: *C.S.J.M university, Uttar Pradesh-208024, India.*
  Specialisation: *Solid state and condensed matter Physics*

- *2003 - 2006:* **Bachelor of Science** [**First class**]
  K.K Girls Degree College, Kanpur, U.P, India
  University: *C.S.J.M university, Uttar Pradesh-208024, India.*
  Subjects: Physics, Chemistry, Mathematics.

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**National Exams Qualified:**

- Qualified for National Eligibility Test (NET) in Physics conducted jointly by the Council of Scientific and Industrial Research (CSIR) and University Grant Commission (UGC), India.
- Qualified Graduate Aptitude Test in Engineering (GATE) in Physics conducted by Ministry of Human Resource and Development, India.

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**Awards Received:**

- Awarded by SERB-National Postdoctoral Fellowship (N-PDF) on March-2022 at Indian Institute of Science Bangalore, India.
- International Travel Grant from Institute for Plasma Research (2017); from Homi Bhabha National Institute, Department of Atomic Energy (2015); from Department of Science and Technology (2016); Government of India.
- **Best poster presentation award** in $7^{th}$ International Conference on the Frontiers of Plasma Physics and technology ($FPPT-7$), Kochi (former Cochin), India, $13-17$ April, 2015. (Title: "Shear flows in two dimensional strongly coupled complex plasma : A comparative study using molecular and fluid simulation".)
- **Best poster presentation award** in the field of computer simulation and modelling in $28^{th}$ National Symposium on Plasma Science & Technology, $PSSI-2013$, KIIT university, Bhubaneshwar, India $3-6$ Dec, 2013. (Title: "Stability and nonlinear studies of shear flow in strongly coupled fluids".)

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**Invited talk:**

- "Path-planning of smart micro-flockers in turbulent flows"
  **Akanksha Gupta**, *Conference on Emerging Trends in Complex Systems, Advanced Materials and Photonics (IC-ETCMP- 2025)* 27-28 *Feb,* 2025.
- "Viscoelastic and compressibility effects on single and multiple coherent structures in a strongly coupled dusty plasma"
  **Akanksha Gupta**, Rupak Mukherjee, and Rajaraman Ganesh. $5^{th}$ *Asia Pacific Conference on Plasma Physics,* 26 *Sept-* 1 *Oct,* 2021.

- "Study of inertial waves in two-dimensional strongly coupled dusty plasma"

  **Akanksha Gupta**, and Rajaraman Ganesh. $4^{th}$ *Asia Pacific Conference on Plasma Physics,* $26-31$ *Oct,* 2020.

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**Oral/Poster Presentations in Conferences (International):**

1. "Study of rotational shear waves in viscoelastic fluids"

   **Akanksha Gupta**, and Rajaraman Ganesh. *The Third Russian Conference on Magnetohydrodynamics, Akademika Koroleva Perm, Russia,* $18-21$ *June,* 2018. **[Poster presentation]**

2. "Compressible Kolmogorov Flow in Strongly Coupled Dusty Plasma: A Study Using Molecular Dynamics and Computational Fluid Dynamics"

   **Akanksha Gupta**, Rajaraman Ganesh, and Ashwin Joy. $8^{th}$ *International Conference on the Physics of Dusty Plasmas (8ICPDP), Prague, Czech Republic,* $20-25$ *May,* 2017. **[Oral presentation]**

3. "Emergence and propagation of elastic wave from a vortex source in strongly correlated dusty plasma using molecular dynamics"

   **Akanksha Gupta**, Rajaraman Ganesh, and Ashwin Joy. $8^{th}$ *International Conference on the Physics of Dusty Plasmas (8ICPDP), Prague, Czech Republic,* $20-25$ *May,* 2017. **[Poster presentation]**

4. "Unstable shear flows in two dimensional strongly correlated liquids- A hydrodynamic and molecular dynamics study"

   **Akanksha Gupta**, Rajaraman Ganesh, Ashwin Joy. $69^{th}$ *Annual meeting of the APS division of fluid dynamics, Portland, U.S.A,* $20-22$ *Nov,* 2016. **[Oral presentation]**

5. "Shear flows in two dimensional strongly coupled complex plasma : A comparative study using molecular and fluid simulations"

   **Akanksha Gupta**, Rajaraman Ganesh, Ashwin Joy. $7^{th}$ *International Conference on the Frontiers of plasma physics and technology* $(FPPT-7)$*, Kochi (former Cochin), India,* $13-17$ *April,* 2015 . **[Poster presentation]**

6. "Kolmogorov flow in 2D strongly coupled dusty plasma :: A comparative study using Molecular dynamics and fluid simulations"

   **Akanksha Gupta**, Rajaraman Ganesh, Ashwin Joy. *Diagnostics and simulation of Dusty Plasmas (DSDP-2015), Kiel, Germany,* $9-11$*, Sept,* 2015. **[Poster presentation]**

7. "A comparative study of Molecular Dynamics simulation and a viscoelastic fluid model for two dimensional shear flows"

   **Akanksha Gupta**, Rajaraman Ganesh, Ashwin Joy. $7^{th}$ *International Conference on the Physics of dusty Plasmas (ICPDP-2014), Delhi, India* $3-7$ *March,* 2014. **[Poster presentation]**

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**National Conferences :**

- "Compressibility effects on quasistationary vortex and transient hole pattern through vortex merger",

  R. Mukherjee, **Akanksha Gupta** and R. Ganesh. *Turbulence from Angstroms to light years, ICTS, Bangluru, India,* $20-25$, 2018. **[Poster presentation]**

- "Can temperature be accessed by real space variable: A numerical example using flowing 2D complex Plasma"

  **Akanksha Gupta**, Rajaraman Ganesh and Ashwin Joy. *The* $32^{nd}$ *National Symposium on Plasma Science and Technology hosted by Institute for Plasma Research, Gandhinagar, Gujarat, India,* $07-10$ *Nov,* 2017. **[Poster presentation]**

- "Onset of 2D Rayleigh-Benard Convection in strongly correlated liquids: A comparative study"

  Pawandeep Kaur, Harish Charan, **Akanksha Gupta**, and Rajaraman Ganesh. *The* $32^{nd}$ *National Symposium on Plasma Science and Technology will be hosted by Institute for Plasma Research, Gandhinagar, Gujarat, India,* $07-10$ *Nov,* 2017. **[Poster presentation]**

- "Kolmogorov Flows in 2D strongly coupled complex plasmas"

  **Akanksha Gupta**, and Rajaraman Ganesh. *The* $29^{th}$ *National Symposium on Plasma Science and Technology and the International Conference on Plasma and Nanotechnology Kottayam, Kerala, India,* $8-11$ *Dec,* 2014. **[Poster presentation]**

- "Stability and nonlinear studies of shear flow in strongly coupled fluids"

  **Akanksha Gupta**, and Rajaraman Ganesh. $8^{th}$ *Conference on Nonlinear Systems and Dynamics, IIT, Indore, India,* $11-14$ *Dec,* 2013. **[Poster presentation]**

- The $28^{th}$ National Conference on Plasma Science and Technology, KIIT university, Bhubaneshwar, India, $3-6$ Dec, 2013.

- $1^{st}$ PSSI-Plasma Scholars Colloquium ($PPSC-2012$), Institute for Plasma Research, Gandhinagar, Gujarat, India, $3-4$ July 2012.

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**Participation in Relevant PhD Schools :**

- Hands-on School on Nonlinear Dynamics, IPR, India, $16-22$ Feb, 2015.
- Nonlinear theory and Simulation program, NIT Durgapur, Kolkata, India, $14-18$ Jan, 2013.
- DST-SERB school on Tokamak and Magnetised Plasma Fusion, Institute for Plasma Research, Gandhinagar, Gujarat, India, 25 Feb-14 March 2013.

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**Professional Affiliation:**

- Lifetime member of Plasma Science Society of India (PSSI).
- Lifetime member of Global Initiative of Academic Networks (GIAN).
- Lifetime member of Association of Asia Pacific Physical Societies-Division of Plasma Physics (AAPPS-DPP).

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