

Articles

I have co-written more than ninety papers, with an h-index of 32 (according to google scholar database). An updated time-ordered list is available in my google scholar page. Here is a list organized by discipline following the PhySH classification of American Physical Society. **Recently published paper** and papers that are not yet peer-reviewed but available as **preprints** are marked.

Physics of Living Systems

Neuroscience

- Renormalization group analysis of noisy neural field.
J. Zang, P. Helson, S. Liu, A. Kumar, and **D. Mitra**, arXiv preprint arXiv:2503.21605.

Membranes

- Anomalous diffusion and effective shear modulus in a semi-solid membrane.
V. Pandey and **D. Mitra**, arXiv preprint arXiv:2404.12211
- Force spectroscopy reveals membrane fluctuations and surface adhesion of extracellular nanovesicles impact their elastic behavior.
F. Stridfeldt, et. al. including **D. Mitra** as co-corresponding author, *Proceedings of the National Academy of Sciences*, **122** (16), e2414174122, (2025).
- Estimate of entropy generation rate can spatiotemporally resolve the active nature of cell flickering.
SK Manikandan, T Ghosh, T Mandal, A Biswas, B Sinha, and **D Mitra**, *Phys. Rev. Research.*, **6**(2) 023310 (2024).
- Formation of clathrin-pits and ATP-independent cholesterol-dependent tubules initiates mechano-regulation on de-adhesion.
T Mandal, A Biswas, T Ghosh, S Manikandan, A Kundu, A Banerjee, **D. Mitra** and B. Sinha, *Cellular and molecular life sciences*, **81**, 43 (2024). bioRxiv 2023.05.31.543020

Biological fluid dynamics

- Measuring red blood cell deformability and its heterogeneity using a fast microfluidic device.
S Kumari, N Mehendale, T Roy, S Sen, **D Mitra**, and D Paul. *Cell Reports Physical Science*, (2024).
- A microfluidic device to sort capsules by deformability.
L. Zhu, C. Rorai, **D. Mitra**, and L. Brandt, *Soft Matter*, **10**, 7705-7711 (2014) (arXiv:1402.6851)

Statistical Physics and Thermodynamics

- Active buckling of pressurized spherical shells: Monte Carlo Simulation.
V Agrawal, V Pandey, and **D Mitra**, *Phys. Rev. E. Letters*, **131**(11), 114002 (2023) arXiv:2206.14172.

- Quantitative analysis of non-equilibrium systems from short-time experimental data.
SK Manikandan, S Ghosh, A Kundu, B Das, V Agrawal, **D Mitra**, A. Banerjee and S Krishnamurthy, *Communications Physics* **4** (1), 1-10, (2021) (arXiv:2102.11374).

Polymers and Soft Matter

- Flexible filament in time-periodic viscous flow: shape chaos and period three.
V Agrawal and **D Mitra**, arXiv preprint arXiv:2210.04781.
- Intermittency in the not-so-smooth elastic turbulence.
R.K. Singh, P. Perlekar, **D. Mitra**, and M.E. Rosti. *Nature Communications*, **15**(1), 4070 (2024).
- Large is different: non-monotonic behaviour of elastic range scaling in polymeric turbulence at large Reynolds and Deborah numbers.
M.E Rosti, P. Perlekar, and **D. Mitra**, *Science Advances*, 9 (11), eadd3831, (2023). (arXiv:2111.11224).
- Chaos and irreversibility of a flexible filament in periodically-driven Stokes flow.
V. Agrawal and **D. Mitra**, *Physical Review E*, **106**, 025103, 2022, arXiv:2111.14638.
- Statistics of polymer extensions in turbulent channel flow
F. Bagheri, **D. Mitra**, P. Perlekar and L. Brandt, *Phys. Rev. E* **86**, 056314 2012 (arXiv: 1011.3766).
- Direct numerical simulations of statistically steady, homogeneous, isotropic fluid turbulence with polymer additives.
P. Perlekar, **D. Mitra** and R. Pandit. *Phys. Rev. E*, **82**, 066313 (2010), (arXiv:1008.0051)
- Manifestations of Drag Reduction by polymer additives in Decaying, Homogeneous, Isotropic Turbulence.
P. Perlekar, **D. Mitra** and R. Pandit. *Phys. Rev. Lett.*, **97**, 264501 (2006). (arXiv:nlin/0609066)

Applied Physics

Machine Learning

- Forecasting Solar Cycle 25 with Physical Model-Validated Recurrent Neural Networks,
A Espuña Fontcuberta, A Ghosh, S Chatterjee, **D Mitra**, D Nandy *Solar Physics* **298** (1), 1-19, (2023). ((arXiv:2005.12166)
- A Comparative Analysis of Machine Learning Models for Solar Flare Forecasting: Identifying High Performing Active Region Flare Indicators.
S Sinha et al including **D Mitra**, *The Astrophysical Journal*, **935**, 45 (2022), arXiv:2204.05910.

- Role of response time of a Babcock-Leighton solar dynamo model in meridional flow-speed reconstruction by EnKF data assimilation.
M. Dikpati, **D. Mitra**, and J.L. Anderson *Advances in Space Research* **58** (8), 1589-1595, 2016).
- Data Assimilation in a Solar Dynamo Model Using Ensemble Kalman Filters: Sensitivity and Robustness in Reconstruction of Meridional Flow Speed.
M. Dikpati, J.L. Anderson, and **D. Mitra**, *ApJ*, **828** (2), 91, 2016.
- Ensemble Kalman filter data assimilation in a Babcock-Leighton solar dynamo model: an observation system simulation experiment for reconstructing meridional flow-speed.
M. Dikpati, J.L. Anderson, and **D. Mitra**, *Geophysical Research Letters*, **41**, 5361—5369, (2014); (arXiv:1408.5113).

Numerical Techniques

- MeMC: A package for monte-carlo simulations of spherical shells. V Agrawal, V Pandey, H Kylhammar, A Dev, **D. Mitra**, *Journal of Open Source Software*, **7**(74), 4305, 2022, arXiv:2203.14551.
- The Pencil Code, a modular MPI code for partial differential equations and particles: multipurpose and multiuser-maintained.
A. Brandenburg et al including **D. Mitra**, *Journal for Open Source Software* **6**, 2807 (2021), (arXiv:2009.08231).

Gravitation, Cosmology & Astrophysics

Planet formation

- Planetesimals on eccentric orbits erode rapidly.
L Cedenblad, N Schaffer, A Johansen, B Mehlig, and **D. Mitra** *The Astrophysical Journal*, **921** (2), 123 (2021). (arXiv:2011.14431)
- Erosion of planetesimals by gas flow
N Schaffer, A Johansen, L Cedenblad, B Mehling, and **D. Mitra** *A&A* **639**, A39 (2020). (arXiv:2005.07951).
- Can planetesimals form by collisional fusion ?
D. Mitra, J. Wetzlauffer, and A Brandenburg, *ApJ*, **773**, 120, (2013). (arXiv:1306.3672).

Fluid Dynamics

Drops and Bubbles

- Scale-by-scale energy transfers in bubbly flows.
H. Narula, V. Pandey, **D. Mitra**, and P Perlekar. *Journal of Fluid Mechanics*, submitted; arXiv preprint arXiv:2506.07693.

- Coagulation drives turbulence in binary fluid mixtures.
A. Bhatnagar, P. Perlekar, and **D. Mitra**. (arXiv:2109.09671)
- Kolmogorov turbulence co-exists with pseudo-turbulence in buoyancy-driven bubbly flows.
V Pandey, **D Mitra**, and P Perlekar, *Phys. Rev. Lett.*, **108**(3), L032601 (2023), arXiv:2204.04505.
- Turbulence modulation in buoyancy-driven bubbly flows.
V Pandey, **D Mitra**, P Perlekar, *Journal of Fluid Mechanics*, **932**, A19, 2022 (arXiv:2105.04812)

Geophysical Fluid Dynamics

- Interfacial waves in the presence of wind and current: an asymptotic study
AF Bonfils, **D Mitra**, W Moon, JS Wettlaufer, *Journal of Fluid Mechanics*, **976**, A19 (2023) (arXiv:2211.02942).
- Asymptotic interpretation of the Miles mechanism of wind-wave instability.
AF Bonfils, **D Mitra**, W Moon, JS Wettlaufer, *Journal of Fluid Mechanics*, **944**, A8, 2022, (arXiv:2107.06844)

Compressible Flows

- Intermittency and non-universality of pair dispersion in isothermal compressible turbulence.
S. De, **D Mitra**, and R. Pandit arXiv preprint arXiv:2504.17292.
- Uncovering the multifractality of Lagrangian pair dispersion in shock-dominated turbulence.
S De, **D. Mitra** and R. Pandit, *Phys. Rev. Research. Letters*, **6**, L022032 (2024) arXiv:2311.06836.
- Dynamic multiscaling in stochastically forced Burgers turbulence.
S De, **D Mitra**, and R Pandit, *Scientific Reports*, **13**, 7151 (2023). arXiv:2205.08969

Porous media

- The breakdown of Darcy's law in a soft porous material.
ME. Rosti, S. Pramanik, L. Brandt, and **D. Mitra**, *Soft Matter*, **16**, 939-944, 2020.(arXiv:1902.02505).

Particle-laden flows

- Rate of formation of caustics in heavy particles advected by turbulence.
A Bhatnagar, V Pandey, P Perlekar, and **D Mitra**, *Philosophical transactions of the royal society A*, **380** (**2219**), 20210086, (2022). (arXiv:2110.02568).
- Paths to caustic formation in turbulent aerosols.
J Meibohm, V Pandey, A Bhatnagar, K Gustavsson, **D Mitra**, P Perlekar, and B Mehlig. *Physical Review Fluids* **6** (6), L062302 (2021)

- Clustering and energy spectra in two-dimensional dusty gas turbulence
V. Pandey, **D. Mitra**, and P. Perlekar, *Phys. Rev. E*, **100**, 013114, (2019). Selected as Editor's choice (arXiv:1902.05435).
- Relative velocities in bi-disperse turbulent aerosols: simulations and theory.
A. Bhatnagar, K. Gustavsson, B. Mehlig, and **D. Mitra** *Phys. Rev. E*, **98**, 063107 (2018). (arXiv:1809.10440)
- Topology of two-dimensional turbulent flows of dust and gas.
D. Mitra, and P. Perlekar, *Phys. Rev. Fluid*, **3**, 044303, (2018). (arXiv:1711.03692).
- Heavy inertial particles in turbulent flows gain energy slowly but lose it rapidly.
A. Bhatnagar, A. Gupta, **D. Mitra**, and R. Pandit, *Phys. Rev. E*, **97**(3), 033102, (2018). (arXiv:1711.06987).
- Statistics of the relative velocity of particles in turbulent flows: monodisperse particles.
A. Bhatnagar, K. Gustavsson, and **D. Mitra**, *Phys. Rev. E*, **97**(2), 023105, (2018). (arXiv:1710.04917).
- Turbophoresis in forced inhomogeneous turbulence, **D. Mitra**, N.E.L. Haugen, I Rogachevskii, *EPJ+*, **133** (2), 35, (2018). (arXiv:1603.00703).
- Deviation-angle and trajectory statistics for inertial particles in turbulence.
A. Bhatnagar, A. Gupta, **D. Mitra**, P. Perlekar, M. Wilkinson, and R Pandit, *Phys. Rev. E* **94** (6), 063112 (2016).
- How long do particles spend in vortical regions in turbulent flows?
A. Bhatnagar, A. Gupta, D. Mitra, R. Pandit, and P. Perlekar *Phys. Rev. E* **94** (5), 053119, (2016).

Turbulence

- First-passage-time problem for tracers in turbulent flows applied to virus spreading.
A.K. Verma, A. Bhatnagar, **D Mitra**, and R Pandit *Physical Review Research* **2** (3), 033239, 2020. (arXiv:2001.01260)
- Dynamics of Saturated Energy Condensation in Two-Dimensional Turbulence
C-K. Chan, **D. Mitra**, A. Brandenburg, *Phys. Rev. E*, **85**, 036315 (2012). (arXiv: 1109.6937).
- Dynamic Multiscaling in Two-dimensional Fluid Turbulence.
S. S. Ray, **D. Mitra**, P. Perlekar, R. Pandit, *Phys. Rev. Lett.*, **107**, 184503 (2011) (arXiv: 1105.5160).
- Persistence Problem in Two-Dimensional Fluid Turbulence.
P. Perlekar, S. S. Ray, **D. Mitra**, and R. Pandit, *Phys. Rev. Lett*, **106**, 054501 (2011) (arXiv: 1009.1494).
- Numerical study of large-scale vorticity generation in shear-flow turbulence.
P.J. Käpylä, **D. Mitra**, and A. Brandenburg, *Phys. Rev. E*, **79**, 016302 (2009). (arXiv:0810.0833).

- The universality of dynamic multiscaling in homogeneous, isotropic Navier–Stokes and passive-scalar turbulence.
S.S. Ray, **D. Mitra**, and R. Pandit *New J. Phys.* **10**, 033003 (2008) (arXiv:0710.5678).
- Dynamic Multiscaling in Fluid Turbulence.
R. Pandit, S.S. Ray and **D. Mitra**, *The European Physical Journal B* **64**, 463-469 (2008). (arXiv:0709.0893).
- Dynamics of Passive-Scalar Turbulence
D. Mitra and R. Pandit, *Phys. Rev. Lett.*, **95**, 144501 (2005). (arXiv:nlin/0412013)
- Is multiscaling an artifact in the Stochastically Forced Burgers Equation ?
D. Mitra, J. Bec, R. Pandit and U. Frisch. *Phys. Rev. Lett.*, **94**, 194501 (2005). (arXiv:nlin/0406049)
- Varieties of Dynamic Multiscaling in Fluid Turbulence.
D. Mitra and R. Pandit. *Phys. Rev. Lett.* **93**, 024501 (2004). (arXiv:nlin/0309037)
- Statistics of active versus passive advections in magnetohydrodynamic turbulence. T. Gilbert and **D. Mitra** *Phys. Rev. E* **69**, 057301 (2004). (arXiv:nlin/0403017).

Reacting flows

- The effect of turbulence on mass transfer rates of small inertial particles with surface reactions.
N.E.L. Haugen, J. Kruger, **D. Mitra**, and T. Lovas, *Journal of Fluid Mechanics*, **836**, 932, (2018). (arXiv:1701.04567).
- The effect of turbulent clustering on particle reactivity.
J. Kruger, N.E.L. Haugen, **D. Mitra**, and T. Lovas, *Proceedings of the Combustion Institute* **36** (2), 2333-2340, 2017.

Rheology

- Rheology of suspensions of viscoelastic spheres: Deformability as an effective volume fraction.
M.E. Rosti, L. Brandt, and **D. Mitra**, *Physical Review Fluids* **3**(1), 012301, (2018) (arXiv:1709.04210).
- Rheology of confined non-Brownian suspensions W. Fornari, L. Brandt, P. Chaudhuri, C.U. Lopez, **D. Mitra**, and F. Picano, *Phys. Rev. Lett.* **116** (1), 018301, (2016) (arXiv:1506.08722).
- Shear thickening in non-Brownian suspensions: an excluded volume effect.
F. Picano, W-P. Breugem, **D. Mitra**, L. Brandt, *Phys. Rev. Lett.*, **111**, 098302, (2013). (arXiv:1211.5501)

Review articles

- An overview of the statistical properties of two-dimensional turbulence in fluids with particles, conducting fluids, fluids with polymer additives, binary-fluid mixtures, and superfluids.
R. Pandit et al including **D. Mitra**, *Physics of Fluids* **29** (11), 111112, (2017).
- Dynamic Multiscaling in fluid turbulence : An Overview.
D. Mitra and R. Pandit, *Physica A*, **318**, 179 (2003).

Plasma Physics

Helioseismology

- Anisotropic Magnetized Asteroseismic Waves.
B. Tripathi and **D. Mitra**, *The Astrophysical Journal*, **976**, 2024, ArXiv:2405.01856.
- Exact Analytical Solutions in Inhomogeneous Magnetic Fields for Linear Asteroseismic Waves.
B. Tripathi and **D. Mitra**, *The Astrophysical Journal*, **934(1)** 61, 2022. (arXiv:1812.06947).

Astrophysical Dynamo

- Kazantsev dynamo in turbulent compressible flows.
M. M. Afonso, **D. Mitra**, and Dario Vincenzi, *Proceedings of the Royal Society A*, **475**, 20180591 (2019). (arXiv:1809.01677)
- Surface flux concentrations and spherical alpha-square dynamo.
S. Jabbari, A. Brandenburg, N. Kleeorin, **D. Mitra**, I. Rogachevskii, *Astronomy & Astrophysics*, **556**, A106, (2013). (arXiv: 1212.2626)
- A mean field dynamo from negative eddy diffusivity.
E. Devlen, A. Brandenburg, **D. Mitra**, *Monthly Notices of Roy. Astron. Soc.*, **432**, 1651-1657, (2013). (arXiv: 1212.2626)
- Scaling and intermittency in incoherent α -shear dynamo.
D. Mitra and A. Brandenburg, *Monthly Notices Roy. Astron. Soc.*, **420**, 2170-2177 (2012) (arXiv: 1107.2419).
- Dynamo-driven plasmoid ejections above a spherical surface.
J. Warnecke, A. Brandenburg, **D. Mitra**, *Astron. Astrophys.*, **534**, A11 (2011) (arXiv: 1104.0664).
- Alleviating alpha quenching by solar wind and meridional flow.
D. Mitra, D. Moss, R. Tavakol and A. Brandenburg, *Astronomy and Astrophysics* **526**, A138 (2011) (arXiv: 1008.4226).
- Magnetic helicity transport in the advective gauge family.
S. Candelaresi, A. Hubbard, A. Brandenburg and **D. Mitra**. *Physics of Plasmas*, **18**, 012903 (2011) (arXiv: 1010.6177).
- Alpha effect due to buoyancy instability of a magnetic layer.
P. Chatterjee, **D. Mitra**, M. Rheinhardt and A. Brandenburg, *Astron. Astrophys.*, **534**, A46 (2011)(arXiv: 1011.1216).
- Oscillatory migrating magnetic fields in helical turbulence in spherical domains.
D. Mitra, R. Tavakol, P.J. Käpylä and A. Brandenburg, *Astrophys. J. Lett*, **719**, L1-L4, (2010), (arXiv:0901.2364).

- Dynamo Onset as a First-Order Transition: Lessons from a Shell Model for Magnetohydrodynamics.
G. Sahoo, **D. Mitra** and R. Pandit. *Phys. Rev. E*, **81**, 036317 (2010). (arXiv:0911.4465).
- Convective dynamos in spherical wedge geometry.
P.J. Käpylä, M.J. Korpi, A. Brandenburg, **D. Mitra** and R. Tavakol *Astron. Nachr.*, **331**, 73-81 (2010), (arXiv:0909.1330).
- Equatorial magnetic helicity flux in simulations with different gauges.
D. Mitra, S. Candelaresi, P. Chatterjee, R. Tavakol and A. Brandenburg *Astron. Nachr.* **331**, 130-135 (2010), (arXiv:0911.0969).
- Turbulent dynamos in spherical shell segments of varying geometrical extent.
D. Mitra, R. Tavakol, A. Brandenburg, and D. Moss, *Astrophys. J*, **697**, 923-933, (2009) (arXiv:0812.3106).
- Alpha effect and diffusivity in helical turbulence with shear.
D. Mitra, P.J. Käpylä, R. Tavakol, and A. Brandenburg, *A & A*, **495**, 1-8 (2008), (arXiv:0806.1608).
- The helicity constraint in spherical shell dynamos
A. Brandenburg, P.J. Käpylä, **D. Mitra**, D. Moss, and R. Tavakol, *Astron. Nachr.*, **328**, 1118-1121 (2007) (arXiv:0711.3616).

Instabilities

- Quantifying the effect of turbulent magnetic diffusion on the growth rate of the magneto-rotational instability.
M. S. Väisälä, A. Brandenburg, **D. Mitra**, P. J. Käpylä, M. J. Mantere, *Astronomy & Astrophysics*, **567**, A139 (2014)(arXiv:1310.3157).
- Breakdown of chiral symmetry during saturation of the Tayler instability
A. Bonanno, A. Brandenburg, F. Del Sordo and **D. Mitra**, *Phys. Rev. E*, **86**, 016313, (2012). (arXiv: 1204.0081)
- Detection of negative effective magnetic pressure instability in turbulence simulations.
A. Brandenburg, K. Kemel, N. Kleeorin, **D. Mitra**, I. Rogachevskii, *Astrophys. J. Lett.*, **740**, L50 (2011) (arXiv: 1109.1270).
- Spontaneous chiral parity breaking by hydromagnetic buoyancy.
P. Chatterjee, **D. Mitra**, A. Brandenburg and M. Rheinhardt, *Phys. Rev. E*, **84**, 025403(R) (2011) (arXiv: 1011.1251).

Plasma-particle interaction

- On the energization of charged particles by fast magnetic reconnection.
R. Sharma, **D. Mitra**, and D. Oberoi, *Monthly Notices of the Royal Astronomical Society*, **470**, 723-731, (2017). (arXiv:1611.04459)

- Anomalous diffusion of field lines and charged particles in Arnold-Beltrami-Childress force-free magnetic fields.
A.K. Ram, B. Dasgupta, V. Krishnamurthy, and **D. Mitra** *Physics of Plasmas*, **21**, 072309 (2014).
- Particle energization through time-periodic helical magnetic fields.
D. Mitra, A. Brandenburg, B. Dasgupta, E. Niklasson, and A. Ram, *Phys. Rev. E*, **89**, 042919 (2014); (arXiv:1306.0151)

Solar Plasma

- Turbulent reconnection of magnetic bipoles in stratified turbulence S. Jabbari, A. Brandenburg, **D. Mitra**, N. Kleeorin, and I. Rogachevskii *Monthly Notices of the Royal Astronomical Society* **459** (4), 4046-4056, 2016.
- Bipolar magnetic spots from dynamos in stratified spherical shell turbulence
S. Jabbari, A. Brandenburg, N. Kleeorin, **D. Mitra**, I. Rogachevskii, *ApJ*, **805** (2), 166, (2015).
- Intense bipolar structures from stratified helical dynamos.
D. Mitra, A. Brandenburg, N. Kleeorin, and I. Rogachevskii, *Monthly Notices of Royal Astronomical Society*, **445**, 761-769, (2014) (arXiv:1404.3194).
- Active region formation through the negative effective magnetic pressure instability.
K. Kemel, A. Brandenburg, N. Kleeorin, **D. Mitra**, I. Rogachevskii, *Solar Phys.*, **287** 293, (2012)(arXiv:1203.1232)
- Rotational effects on the negative magnetic pressure instability.
I.R. Losada, A. Brandenburg, N. Kleeorin, **D. Mitra**, I. Rogachevskii, *Astronomy & Astrophysics*, **548**, A49, (2012). (arXiv: 1207.5392)
- Spontaneous formation of magnetic flux concentrations in stratified turbulence.
K. Kemel, A. Brandenburg, N. Kleeorin, **D. Mitra**, I. Rogachevskii, *Solar Phys.*, **280** 321, (2012) (arXiv:1112.0279)

Conference Proceedings

4. Reconstructing meridional flow speed variation by implementing EnKF/DART sequential data assimilation.
M. Dikpati, J.L. Anderson, and **D. Mitra**, AGU Fall Meeting Abstracts 1, 2095, (2013)
3. Spontaneous chiral symmetry breaking in the Tayler instability.
F. Del Sordo, A. Bonanno, A. Brandenburg, and **D. Mitra**, in Comparative Magnetic Minima: Characterizing quiet times in the Sun and stars, ed. C. H. Mandrini & D. F. Webb, Proc. IAU Symp., Vol. 286, pp. 65-69 (arXiv:1111.1742).
2. Plasmoid ejections driven by dynamo action underneath a spherical surface.
J. Warnecke, A. Brandenburg, and **D. Mitra**, in Advances in Plasma Astrophysics, ed. A. Bonanno, E. de Gouveia dal Pino, & A. Kosovichev, Proc. IAU Symp., Vol. 274, pp. 306-309 (arXiv:1011.4299)

1. Oscillatory migratory large-scale fields in mean-field and direct simulations.
D. Mitra , R. Tavakol, A. Brandenburg, A., and P.J. Käpylä, in Solar and Stellar Variability: Impact on Earth and Planets, Vol. 264, ed. A. Kosovichev et al., Cambridge University Press, pp. 197-201, 2010.