

Ambrish Pandey



Personal Details

Nationality: Indian

Gender: Male

Date of Birth: July 02, 1988

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Affiliation

Department of Physics,
Indian Institute of Technology
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Contact

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Research Interests

Exploring Turbulent Flows using Numerical Simulations: Atmospheric Turbulence, Geo- and Astrophysical Turbulent Flows, Solar and Stellar Convection, Computational Fluid Physics

Present Employment

Assistant Professor (Jan. 2023 — present)

Department of Physics,
Indian Institute of Technology Roorkee
Haridwar 247667, Uttarakhand, India

Post-Doc Positions

Research Associate (Dec. 2019 — Dec. 2022)

Center for Space Science, New York University Abu
Dhabi, Abu Dhabi 129188, UAE
Advisor: Prof. Katepalli R. Sreenivasan

Post-Doctoral Fellow (Nov. 2016 — Nov. 2019)

Institut für Thermo- und Fluidodynamik,
Department of Mechanical Engineering,
Technische Universität Ilmenau,
Ilmenau 98693, Germany
Advisor: Prof. Dr. Jörg Schumacher

Education

M.Sc.-Ph.D. (Dual Degree) (2016)

Department of Physics, Indian Institute of Technology
Kanpur, Kanpur 208016, Uttar Pradesh, India
Advisor: Prof. Mahendra K. Verma

B. Sc. (Honours) in Physics (2008)

Department of Physics, Banaras Hindu University,
Varanasi 221005, Uttar Pradesh, India

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Publications

1. **A. Pandey**, D. Krasnov, J. Schumacher, R. Samtaney, and K. R. Sreenivasan, *Similarities between characteristics of convective turbulence in confined and extended domains*, *Physica D* **442**, 133537 (2022). [pdf](#)
2. **A. Pandey**, D. Krasnov, K. R. Sreenivasan, and J. Schumacher, *Convective mesoscale turbulence at very low Prandtl numbers*, *J. Fluid. Mech.* **948**, A23 (2022). [pdf](#)
3. S. Moller, T. Käufer, **A. Pandey**, J. Schumacher, and C. Cierpka, *Combined particle image velocimetry and thermometry of turbulent superstructures in thermal convection*, *J. Fluid Mech.* **945**, A22 (2022). [pdf](#)
4. **A. Pandey**, J. Schumacher, and K. R. Sreenivasan, *Non-Boussinesq convection at low Prandtl numbers relevant to the Sun*, *Phys. Rev. Fluids* **6**, 100503 (2021). [pdf](#)
5. **A. Pandey** and K. R. Sreenivasan, *Convective heat transport in slender cells is close to that in wider cells at high Rayleigh and Prandtl numbers*, *Europhys. Lett.* **135**, 24001 (2021). [pdf](#)
6. **A. Pandey**, J. Schumacher, and K. R. Sreenivasan, *Non-Boussinesq low-Prandtl number Convection with a Temperature-dependent Thermal Diffusivity*, *Astrophys. J.* **907**, 56 (2021). [pdf](#)
7. **A. Pandey**, *Thermal boundary layer structure in low-Prandtl-number turbulent convection*, *J. Fluid Mech.* **910**, A13 (2021). [pdf](#)
8. C. Schneide, M. Stahn, **A. Pandey**, O. Junge, P. Koltai, K. Padberg-Gehle, and J. Schumacher, *Lagrangian coherent sets in turbulent Rayleigh-Bénard convection*, *Phys. Rev. E* **100**, 053103 (2019). [pdf](#)
9. E. Fonda*, **A. Pandey***, J. Schumacher, and K. R. Sreenivasan, *Deep learning in turbulent convection networks*, *Proc. Natl. Acad. Sci. USA* **116** (18) 8667–8672 (2019). [pdf](#) [SM](#) [*equal contribution]
10. C. Schneide, **A. Pandey**, K. Padberg-Gehle, and J. Schumacher, *Probing turbulent superstructures in Rayleigh-Bénard convection by Lagrangian trajectory clusters*, *Phys. Rev. Fluids* **3**, 113501 (2018). [pdf](#)
11. J. Schumacher, **A. Pandey**, V. Yakhot, and K. R. Sreenivasan, *Transition to turbulence scaling in Rayleigh-Bénard convection*, *Phys. Rev. E* **98**, 033120 (2018). [pdf](#)
12. **A. Pandey**, M. K. Verma, and M. Barma, *Reversals in infinite-Prandtl-number Rayleigh-Bénard convection*, *Phys. Rev. E* **98**, 023109 (2018). [pdf](#)
13. **A. Pandey**, J. D. Scheel, and J. Schumacher, *Turbulent Superstructures in Rayleigh-Bénard convection*, *Nat. Commun.* **9**, 2118 (2018). [pdf](#) [SM](#)
14. S. Bhattacharya, **A. Pandey**, A. Kumar, and M. K. Verma, *Complexity of viscous dissipation in turbulent thermal convection*, *Phys. Fluids* **30**, 031702 (2018). [pdf](#)
15. M. Mannattil, **A. Pandey**, M. K. Verma, and S. Chakraborty, *On the Applicability of Low-Dimensional Models for Convective Flow Reversals at Extreme Prandtl Numbers*, *Eur. Phys. J. B* **90**, 259 (2017). [pdf](#)
16. M. K. Verma, A. Kumar, and **A. Pandey**, *Phenomenology of buoyancy-driven turbulence: recent results*, *New J. Phys.* **19**, 025012 (2017). [pdf](#)
17. J. Schumacher, V. Bandaru, **A. Pandey**, and J. D. Scheel, *Transitional boundary layers in low-Prandtl-number convection*, *Phys. Rev. Fluids* **1**, 084402 (2016). [pdf](#)

18. **A. Pandey**, A. Kumar, A. G. Chatterjee, and M. K. Verma, *Dynamics of large-scale quantities in Rayleigh-Bénard convection*, [Phys. Rev. E **94**, 053106 \(2016\)](#). pdf
19. D. Nath, **A. Pandey**, A. Kumar, and M. K. Verma, *Near isotropic behavior of turbulent thermal convection*, [Phys. Rev. Fluids **1**, 064302 \(2016\)](#). pdf
20. **A. Pandey** and M. K. Verma, *Scaling of large-scale quantities in Rayleigh-Bénard convection*, [Phys. Fluids **28**, 095105 \(2016\)](#). pdf
21. **A. Pandey**, M. K. Verma, A. G. Chatterjee, and B. Dutta, *Similarities between 2D and 3D convection for large Prandtl number*, [Pramana - J. Phys. **87**, 13 \(2016\)](#). pdf
22. M. K. Verma, S. C. Ambhire, and **A. Pandey**, *Flow reversals in turbulent convection with free-slip walls*, [Phys. Fluids **27**, 047102 \(2015\)](#). pdf
23. **A. Pandey**, M. K. Verma, and P. K. Mishra, *Scaling of heat flux and energy spectrum for very large Prandtl number convection*, [Phys. Rev. E **89**, 023006 \(2014\)](#). pdf
24. M. K. Verma, P. K. Mishra, **A. Pandey**, and S. Paul, *Scalings of field correlations and heat transport in turbulent convection*, [Phys. Rev. E **85**, 016310 \(2012\)](#). pdf

Conference Proceedings

1. A. Klünker, C. Schneide, **A. Pandey**, K. Padberg-Gehle, and J. Schumacher, *Lagrangian perspectives on turbulent superstructures in Rayleigh-Bénard convection*, [PAMM . Proc. Appl. Math. Mech. **19**, e201900201 \(2019\)](#). pdf
2. A. Frasson, M. Ender, S. Weiss, M. Kanzler, **A. Pandey**, J. Schumacher, and R. Westermann, *Visual Exploration of Circulation Rolls in Convective Heat Flows*, [IEEE PacificVis 202-211 \(2019\)](#). pdf
3. **A. Pandey**, C. Schneide, K. Padberg-Gehle, J. D. Scheel, and J. Schumacher, *Eulerian and Lagrangian Perspectives on Turbulent Superstructures in Rayleigh-Bénard Convection*, [NIC Series **49**, 421—428 \(2018\)](#). pdf
4. **A. Pandey** and J. Schumacher, *Turbulent superstructures in Rayleigh-Bénard convection for varying Prandtl numbers*, [PAMM . Proc. Appl. Math. Mech. **17**, 15—18 \(2017\)](#). pdf
5. M. K. Verma, **A. Pandey**, P. K. Mishra, and M. Chandra, *Role of bulk flow in turbulent convection*, [AIP Conference Proceedings **1582**, 224 \(2014\)](#). pdf

Talks/Posters presented in Conferences/Workshops

- **A. Pandey**, J. Schumacher, and K. R. Sreenivasan, *Estimate of the turbulent Prandtl number in thermal convection*, [Euromech Colloquium 619](#), July 06-08, 2022, Vienna, Austria
- **A. Pandey**, J. Schumacher, and K. R. Sreenivasan, *Temperature-dependent thermal diffusivity in turbulent convection in an extended domain*, [73rd Annual Meeting of the APS Division of Fluid Dynamics](#), November 22-24, 2020, Virtual Meeting.
- **A. Pandey**, J. D. Scheel, E. Fonda, K. R. Sreenivasan, and J. Schumacher, *Turbulent superstructures in Rayleigh-Bénard convection*, [SuperMUC Status and Results Workshop 2018](#), July 24-25, 2018, Munich, Germany.

- **A. Pandey**, J. D. Scheel, and J. Schumacher, *Turbulent Superstructures in Rayleigh-Bénard Convection*, [International Conference on Rayleigh-Bénard Turbulence](#), May 14-18, 2018, Enschede, The Netherlands.
- **A. Pandey**, C. Schneide, K. Padberg-Gehle, J. D. Scheel, and J. Schumacher, *Eulerian and Lagrangian Perspectives on Turbulent Superstructures in Rayleigh-Bénard Convection*, [NIC Symposium 2018](#), Feb 22-23, 2018, Jülich, Germany.
- **A. Pandey**, J. D. Scheel, and J. Schumacher, *Turbulent Superstructures in Rayleigh-Bénard Convection*, [16th European Turbulence Conference \(ETC16\)](#), August 21-24, 2017, Stockholm, Sweden.
- **A. Pandey** and J. Schumacher, *Turbulent superstructures in thermal convection for varying Prandtl number*, contributed poster, [Euromech Colloquium 586: Turbulent superstructures in closed and open flows](#), July 12-14, 2017, Erfurt, Germany.
- **A. Pandey**, J. D. Scheel, and J. Schumacher, *Turbulent Superstructures in Rayleigh-Bénard Convection*, [Summer School and Discussion Meeting on Buoyancy-Driven Flows](#), June 12-20, 2017, Bengaluru, India.
- **A. Pandey** and J. Schumacher, *Turbulent superstructures in thermal convection flows*, [88th Annual Meeting of the International Association of Applied Mathematics and Mechanics \(GAMM\)](#), March 6-10, 2017, Ilmenau@Weimar, Germany.
- **A. Pandey**, M. K. Verma, and S. Ambhire, *Flow reversals in turbulent convection with free-slip walls*, [International Conference on Rayleigh-Bénard Turbulence 2015](#), June 1-5, 2015, Göttingen, Germany.
- **A. Pandey** and M. K. Verma, *Characterization of large-scale quantities and energy spectrum for very large Prandtl numbers*, [European Turbulence Conference 14 \(ETC14\)](#), September 1-4, 2013, Lyon, France.

Ph.D. Thesis

Title: Scaling of large-scale quantities in Rayleigh-Bénard convection. [pdf](#)

Research Visit

Visited Technische Universität Ilmenau, Germany as a guest scientist from January to March 2016.

Awards

1. *Best Paper Award of the TU Ilmenau 2020* for the article *Turbulent Superstructures in Rayleigh-Bénard convection*, [Nature Communications](#) **9**, 2118 (2018).
2. *Junior Research Fellowship*, conducted by the Council of Scientific and Industrial Research (CSIR), India.

Referee for Journals

- Journal of Fluid Mechanics
- Europhysics Letters
- Scientific Reports
- Chaos: An Interdisciplinary Journal of Nonlinear Science
- European Journal of Mechanics – B/Fluids
- Physics of Fluids
- Zeitschrift für Angewandte Mathematik und Mechanik (ZAMM)

Teaching Experience

- Taught a course on *Advanced Fluid Mechanics* at Technische Universität Ilmenau in 2018 jointly with Prof. Jörg Schumacher.