Curriculum Vitae

Dr. Krishna Kumar

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Date of Birth: July 20, 1960
Place of Birth: Jamshedpur, India
Nationality: Indian

Academic Positions:

Professor (12 April, 2007 - currently):
Department of Physics, Indian Institute of Technology, Kharagpur

Associate Professor (17 Dec, 2002 - 11 April, 2007):
Department of Physics, Indian Institute of Technology, Kharagpur

Associate Professor (July, 1999 - 16 Dec. 2002):
Physics and Applied Mathematics Unit, Indian Statistical Institute, Kolkata

Lecturer (August, 1995 - June, 1999):
Physics and Applied Mathematics Unit, Indian Statistical Institute, Kolkata

Visiting Professor (June, 1995 - July, 1995):
Ecole Normale Supérieure, Lyon, France

Senior Visiting Scientist (August, 1994 – December, 1994)
Department of Physics, Indian Institute of Technology, Kanpur

Visiting Faculty (January, 1991 - August, 1993):
Ecole Normale Supérieure, Lyon, France

Postdoctoral Fellow (Dec, 1988 - August, 1990):
University des Saarlandes, Saarland, Germany

Research Associate (Dec, 1987 - June, 1988):
Department of Physics, Indian Institute of Technology, Kanpur

Research Areas:

Hydrodynamic Instabilities
Interfacial Waves
Nonlinear Dynamics

Education:

Ph.D. (1987): Department of Physics, Indian Institute of Technology, Kanpur-208016, India
M.Sc. (1983)**:** Department of Physics & Meteorology, Indian Institute of Technology, Kharagpur-721302, India

Teaching Experience:

Theory Courses**:** Physics-I (PH14002); Physics (PH 11001); Classical Mechanics-I (PH20007); Classical Mechanics-II (PH31007); Classical Mechanics (40027); Quantum Mechanics-I (PH31001, PH41001); Electrodynamics-I (PH21001); Order and Chaos (PH41009, PH52005); Statistical Physics-I (PH41023); Statistical Physics (PH51003); Nonlinearity, Order & Chaos(PH40004); Pattern-forming Instabilities (PH60407); Science and Complexity (PH58007)

Laboratory courses**:** Physics-I Laboratoty (PH14002), Physics Laboratory (PH19001), General Properties & Thermal Physics Laboratory (PH29001), Electromagnetism and Optics Laboratory (PH29008).

Ph. D. Guidance:

1. Alaka Das (2006): "Dynamical systems for pattern-forming instabilities in convecting fluids"
2. Gour C. Mondal (2008): "Effect of rotation and surface tension inhomogeneity on parametric surface waves".
3. Pinak Pal (2008): "Thermal convection in very low-Prandtl-number fluids".
4. Supriyo Paul (2008): "Instabilities in externally driven hydrodynamics systems".
5. Hirdesh K. Pharasi (2015): "Oscillatory and turbulent rotating convection in low-Prandtl-number fluids".
6. Priyanka Maity (2016): "Patterns and Bifurcations in low-Prandtl-number Rayleigh-Bénard convection with slow rotation".
7. Avirup Das (2016): "Ion conducting polymer blend for device applications". (Jointly with Dr. A.K. Thakur)
8. Arnab Basak (2017): "Rayleigh-Bénard magneto-convection in low-Prandtl-number fluids".

Awards/Fellowships:

1. President of India Award for the best paper by Indian Society of Theoretical and Applied Mechanics (ISTAM), 1986

2. Alexander von Humboldt Fellow (Dec., 1988 – August, 1990)

3. Geophysical Fluid Dynamics Summer Fellowship (1991), Woodshole Oceanograhic Institution, Woodshole, U.S.A.

Refereeing Experience:

1. Physical Review Letters
2. Physical Review E
3. Proceedings of Royal Society, London A
4. Journal of Fluid Mechanics
5. Pramana

Sponsored Project:

1. “Pattern-forming instabilities and interface waves” at Indian Statistical Institute, Kolkata.

2. “Studies in Quantum Information with electron and photon spectroscopy” at IIT Kharagpur

Publications:

1. *Phys. Plasmas* **25** 012119 (2018), Hiya Mondal, Alaka Das and *Krishna Kumar*, "Onset of oscillatory Rayleigh-Bénard magnetoconvection with rigid horizontal boundaries". [DOI: https://doi.org/10.1063/1.5009540, AIP, Impact Factor: 2.115]

2. *Vibration Spectroscopy* **92** (2017), Avirup Das, Awalendra K. Thakur and *K. Kumar*, "Raman spectroscopic study of ion dissociation effect in clay intercalated polymer blend nano composite electrolyte". [DOI: https://doi.org/10.1016/j.vibspec.2017.04.007, Impact Factor: 1.968]

3. *Chaos* **26**, 123123 (2016), Arnab Basak and *Krishna Kumar*, "Effects of a small magnetic field on homoclinic bifurcations in a low-Prandtl-number fluid". [DOI: https://doi.org/10.1063/1.4972560, AIP, Impact factor: 2.312]

4. *Phys. Fluid* **28**, 055103 (2016), Hirdesh Pharasi, Deepesh Kumar, *Krishna Kumar*, and Jayanta K. Bhattacharjee, "Spectra and probability distributions of thermal flux in turbulent Rayleigh-Bénard convection". [DOI: https://doi.org/10.1063/1.4948644, Impact Factor: 2.232]

5. *Eur. Phys. J. B* **88**, 244 (2015), Arnab Basak and *Krishna Kumar*; "A model for Rayleigh-Bénard magnetoconvection". [DOI: https://doi.org/10.1140/epjb/e2015-60579-1, Springer, Impact Factor: 1.461]

6. *Int. J. Mechanics and Engineering* **20**, 257 (2015), Alaka Das and *Krishna Kumar*; "The dynamics of parametrically driven damped pendulum". [DOI: https://doi.org/10.1515/ijame-2015-0017]

7. *J. Phys. Chem. Solids* **80**, 62 (2015), Avirup Das, Awalendra K. Thakur and *K. Kumar*; "Origin of near constant loss (NCL) in ion conducting polymer blends". [DOI: http://dx.doi.org/10.1016/j.jpcs.2015.01.003, Elsevier, Impact Factor: 2.048]

8. *Eur. J. Phys.* **35**, 035006 (2014), Shayak Bhattacharjee and *Krishna Kumar*; "Parametric instability in the Watt governor with periodic loading". [DOI: https://doi.org/10.1088/0143-0807/35/3/035017, IOP, Impact factor: 0.614]

9. *Phys. Rev. E* **90**, 033002 (2014), Arnab Basak, Rohit Raveendran and *Krishna Kumar*; "Rayleigh-Bénard convection with uniform vertical magnetic field". [DOI: https://doi.org/10.1103/PhysRevE.90.033002, APS, Impact Factor: 2.233, Citations: **6**]

10. *Phys. Fluids* **90**, 104103 (2014), Priyanka Maity and *Krishna Kumar*; "Zero-Prandtl-number convection with slow rotation". [DOI: https://doi.org/10.1063/1.5006530, AIP, Impact Factor: 2.232]

11. *Phys. Rev. E* **90**, 041004(R) (2014), Hirdesh K. Pharasi, *Krishna Kumar* and Jayanta K. Bhattacharjee; "Frequency spectra of turbulent thermal convection with uniform rotation". [APS, DOI: https://doi.org/10.1103/PhysRevE.90.041004, Impact Factor: 2.233, Citations: **4**]

12. *Eur. Phys. J. B* **87**, 278 (2014), Surajit Dan, Pinaki Pal and *Krishna Kumar*, "Low-Prandtl-number Rayleigh-Bénard convection with stress-free boundaries". [DOI: https://doi.org/10.1140/epjb/e2014-50468-6, Springer-Verlag, Impact Factor: 1.34]

13. *Solid State Ionics* **268**, 185 (2014), Avirup Das, Awalendra K. Thakur and *K. Kumar*; "Conductivity scaling and near-constant loss behavior in ion conducting polymer blend". [DOI: http://dx.doi.org/10.1016/j.ssi.2014.10.007, Elsevier, Impact Factor: 2.354]

14. *Phys. Rev. E* **89**, 023009 (2014), Hirdesh K. Pharasi, *Krishna Kumar* and Jayanta K. Bhattacharjee; "Entropy and energy spectra in low-Prandtl-number convection with rotation". [APS, DOI: https://doi.org/10.1103/PhysRevE.89.023009, APS, Impact Factor: 2.233, Citations: **8**]

15. *Solid State Ionics* **262**, 815 (2014), Avirup Das, Awalendra K. Thakur, and *K. Kumar*; "Evidence of low temperature relaxation and hopping in ion conducting polymer blend". [DOI: https://doi.org/10.1016/j.ssi.2013.10.015, Elsevier, Impact Factor: 2.354]

16. *Europhys. Lett.* **103**, 64003 (2013), Priyanka Maity, *Krishna Kumar*, and Pinaki Pal; "Homoclinic bifurcations in low-Prandtl-number Rayleigh-Bénard convection with uniform rotation". [DOI: https://doi.org/10.1209/0295-5075/103/64003, IOP, Impact Factor: 2.171, Citations: **5**]

17. *Phys. Fluids* **25**, 104105 (2013), Hirdesh K. Pharasi and *Krishna Kumar*; "Oscillatory instability and fluid patterns in low-Prandtl-number Rayleigh-Bénard convection with uniform rotation". [AIP, DOI: https://doi.org/10.1063/1.4825281, Impact Factor: 2.017, Citations: **3**]

18. *Ionics* **19**, 1811-1823 (2013), Avirup Das, Awalendra K. Thakur, and *K. Kumar*; "Exploring low temperature Li+ ion conducting plastic battery electrolyte". [DOI: https://doi.org/10.1007/s11581-013-0898-x, Springer, Impact Factor: 2.119, Citations: **13**]

19. *Phys. Rev. E* **87**, 023001 (2013), Pinaki Pal, *Krishna Kumar*, Priyanka Maity, and Syamal Kumar Dana; "Pattern dynamics near inverse homoclinic bifurcation in fluids". [DOI: https://doi.org/10.1103/PhysRevE.87.023001, APS, Impact Factor: 2.233, Citations: **11**]

20. *Eur. Phys. J. B* **85**, 30048 (2012), Pinaki Pal and *Krishna Kumar*; "Role of uniform horizontal magnetic field on convective flow". [DOI: https://doi.org/10.1140/epjb/e2012-30048-8, Springer-Verlag, Impact Factor: 1.34]

21. *Int. J. Bifurcation Chaos* **22**, 1230018 (2012), Supriyo Paul, Mahendra K. Verma, Pankaj Wahi, Sandeep K. Reddy, and *Krishna Kumar*, "Bifurcation analysis of the flow patterns in two dimensional Rayleigh-Bénard convection". [DOI: https://doi.org/10.1142/S0218127412300182, World Scientific, Impact factor: 1.329]

22. *Phys. Rev. E* **10**, 047301 (2011), Hirdesh K. Pharasi, Rahul Kannan, *Krishna Kumar* and Jayanta K. Bhattacharjee; "Turbulence in rotating Rayleigh-Bénard convection in low-Prandtl number fluids". [DOI: https://doi.org/10.1103/PhysRevE.84.047301, APS, Impact Factor: 2.233, Citations: **12**]

23. *Pramana* **74**, 75 (2010), Supriyo Paul, *Krishna Kumar*, Mahendra K. Verma, Daniele Carati,Arnab K. De, Vinayak Eswaran; "Chaotic travelling rolls in Rayleigh-Bénard convection". [DOI: https://doi.org/10.1007/s12043-010-0009-8, Springer, Impact Factor: 0.692]

24. *Europhys. Lett.* **87**, 54003 (2009), Pinaki Pal, Pankaj Wahi, Supriyo Paul, Mahendra K. Verma, *K. Kumar*, and Pankaj K. Mishra; "Bifurcation and chaos in zero-Prandtl-number convection". [IOP, DOI: https://doi.org/10.1209/0295-5075/87/54003, Impact Factor: 2.171, Citations: **17**]

25. *Pramana* **71**, 545 (2008), Alaka Das and *Krishna Kumar*; "Model for modulated and chaotic waves in zero-Prandtl-number rotating convection". [DOI: https://doi.org/10.1007/s12043-008-0130-0, Springer, Impact Factor: 0.692]

26. *Phys. Rev. E* **78**, 036409 (2008), Mahendra K. Verma, Thomas Lessinnes, Daniele Carati, Ioannis Sarris, *Krishna Kumar* and Meenakshi Singh; "Dynamo transition in low-dimensional models". [DOI: https://doi.org/10.1103/PhysRevE.78.036409, APS, Impact Factor: 2.233, Citations: **11**]

27. *Proc. R. Soc.* (Lond.) *A* **463** (2079), 711 (2007), Supriyo Paul and *Krishna Kumar*; "Effect of magnetic field on parametrically driven surface waves". [DOI: https://doi.org/10.1098/rspa.2006.1789, Impact Factor: 2.45, The Royal Society, Citations: **2**]

28. *Ind. J. Phys.* **81**, 1226 (2007), *Krishna Kumar*, Supriyo Pal and Dharmesh Jain; "Rhombic patterns near a bicritical point in parametrically forced surface waves". [Springer, Impact Factor: 0.988]

29. *Ind. J. Phys.* **81**, 1205 (2007), Pinaki Pal and *Krishna Kumar*; "The effect of magnetic field on wavy roll instability". [Springer, Impact Factor: 0.988]

30. *Europhys. Lett.* **74**, 1020, (2006) *Krishna Kumar*, Pinaki Pal, and Stéphan Fauve; "Critical bursting". [DOI: https://doi.org10.1209/epl/i2006-10051-7, IOP, Impact Factor: 2.171, Citations: **7**]

31. *Pramana-J Phys.* **67**, 1129-1140 (2006), M.K. Verma, *K. Kumar*, and B. Kamble; "Mode-to-mode energy transfers in convective patterns". [DOI: https://doi.org/10.1007/s12043-006-0028-7, Springer, Impact Factor: 0.692, Citations: **3**]

32. *Phys. Fluids* **28**, 032101 (2006), G.C. Mondal and *Krishna Kumar*; "Effect of Marangoni and Coriolis forces on multicritical points in Faraday experiments". [DOI: https://doi.org/10.1063/1.2167994, AIP, Impact Factor: 2.017, Citations: **4**]

33. *Europhys. Lett.* **65**, 330 (2004) *Krishna Kumar*, A. Bandyopadhyay, and G.C. Mondal; "Parametric instability in a fluid with temperature dependent surface tension". [DOI: https://doi.org/10.1209/epl/i2003-10085-3, IOP, Impact Factor: 2.171, Citations: **6**]

34. *Proc. R. Soc.* (London) *A* **460** (2043), 497 (2004), G.C. Mondal and *Krishna Kumar*; "The effect of the Coriolis force on Faraday waves". [DOI: https://doi.org/10.1098/rspa.2003.1259, The Royal Society, Impact Factor: 2.45, Citations: **8**]

35. *Phys. Rev. E* **65**, 04732 (2002), Pinaki Pal and *Krishna Kumar*; "Wavy stripes and squares in zero-Prandtl-number convection". [DOI: https://doi.org/10.1103/PhysRevE.65.047302, APS, Impact Factor: 2.233, Citations: **13**]

36. *Phys. Rev. E* **65**, 026311(8) (2002), *Krishna Kumar*, Alaka Das, and Sanjay Chaudhury; "Quasiperiodic waves at the onset of zero-Prandtl-number convection with rotation". [DOI: https://doi.org/10.1103/PhysRevE.65.026311, APS, Impact Factor: 2.233, Citations: **8**]

37. *Phys. Rev. E* **64**, 016301(4) (2001), Alaka Das, *Krishna Kumar*, and N. Ganesh; "Model of interacting instabilities and texture dynamics". [DOI: https://doi.org/10.1103/PhysRevE.64.016301, PubMed ID: 11461385, APS, Impact Factor: 2.233, Citations: **1**]

38. *Phys. Rev. E* **62**(3), R3051-R3154 (2000), Alaka Das, Ujjal Ghosal, and *Krishna Kumar*; "Asymmetric squares as standing waves in Rayleigh-Bénard convection". [DOI: https://doi.org/10.1103/PhysRevE.62.R3051, APS, Impact Factor: 2.233, Citations: **12**]

39. *Physica A* 270, 97-104 (1999), K. Kumar, E. Falcon, K.M.S. Bajaj, and J.K. Bhattacharjee; "Shape of convective cell in Faraday experiment with fine granular materials". [DOI: https://doi.org/10.1016/S0378-4371(99)00134-X, Elsevier, Impact Factor: 1.738, Citations: **15**]

40. *Phys. Rev. E* **59**, 5716-5720 (1999), E. Falcon, *Krishna Kumar*, K.M.S. Bajaj, and J.K. Bhattacharjee; "Heap corrugation and hexagon formation of powder under vertical vibrations". [DOI: https://doi.org/10.1103/PhysRevE.59.5716, APS, Impact Factor: 2.233, Citations: **20**]

41. *J. Phys. (France) II* **6**(6), 945-951 (1996), *Krishna Kumar*, Stéphan Fauve and Olivier Thual; "Critical self-tuning: The example of zero-Prandtl-number convection". [DOI: https://doi.org/10.1051/jp2:1996213, EDP Sciences, Impact Factor: , Citations: **35**]

42. *Proc. R. Soc.* (London) *A* **452** (1948) 1113-1126 (1996), *Krishna Kumar*; "Linear theory of Faraday instability in viscous liquids". [DOI: https://doi.org/10.1098/rspa.1996.0056, The Royal Society, Impact Factor: 2.45, Citations: **170**]

43. *Phys. Rev. E* **52**, R4606-R4609 (1995), *Krishna Kumar* and K.M.S. Bajaj; "Competing patterns in the Faraday instability". [DOI: https://doi.org/10.1103/PhysRevE.52.R4606, APS, PubMed ID: 9964085, Impact Factor: 2.233, Citations: **55**]

44. *J. Fluid Mech.* **279**, 49-68 (1994), *Krishna Kumar* and L.S. Tuckerman; "Parametric instability of the interface between two fluids". [DOI: https://doi.org/10.1017/S0022112094003812, Cambridge University Press, Impact Factor: 2.51, Citations: **310**]

45. *Phys. Rev. Letts.* **68** (21), 3160-3163 (1992) S. Fauve, *K. Kumar*, C. Laroche, D. Beysens, and Y. Garrabos; "Parametric instabi8lity of a liquid-vapor interface between two fluids". [DOI: https://doi.org/10.1103/PhysRevLett.68.3160, APS, PubMed ID: 10045629, Impact Factor: 7.645, Citations: **108**]

46. *Phys. Rev. A* **41** (6), 3134-3143 (1990), *Krishna Kumar*; "Convective patterns in rotating fluids". [DOI: https://doi.org/10.1103/PhysRevA.41.3134, APS, PubMed ID: 9903468, Impact Factor: 2.598, Citations: **6**]

47. *Am. J. Physics* **55** (7), 659-661 (19987), G.P. Sastry, *K. Kumar*, and S. Chakrabarty; "Locating the extraordinary ray". [DOI: https://doi.org/10.1119/1.15041, AAPT, Impact Factor: 0.956, Citations: **1**]

48. *Proc. R. Soc.* (London) *A* **411** (1840), 35-47 (1987), G.P. Sastry and *Krishna Kumar*; "Cherenkov ray cones in crystalline media". [DOI: https://doi.org/10.1098/rspa.1987.0052, The Royal Society, Impact Factor: 2.45, Citations: **1**]

49. *Phys. Rev. A* **35** (5), 2334-2336 (1987), *Krishna Kumar*, Arvind Agarawal, Jayanta K. Bhattacharjee, and Kalyan Banerjee; "Precursor transition in dynamical systems undergoing period doubling". [DOI: https://doi.org/10.1103/PhysRevA.35.2334, APS, PubMed ID: 9898414, Impact Factor: 2.598, Citations: **4**]

50. *Phys. Fluids* **29** (12), 4032-4034 (1986), *Krishna Kumar*, Jayanta K. Bhattachrjee, and Kalyan Banerjee; "Overstability in magnetohydrodynamics convection revisited". [AIP, DOI: https://doi.org/10.1063/1.865744 , Impact Factor: 2.017, Citations: **4**]

51. *Phys. Rev. A* **34** (6), 5000-5006 (1986), *Krishna Kumar*, Jayanta K. Bhattacharjee, and Kalyan Banerjee; "Onset of the first instability in hydrodynamics flows: Effect of parametric modulation". [American Physical Society, DOI: https://doi.org/10.1103/PhysRevA.34.5000, PubMed ID: 9897884, Impact Factor: 2.598, Citations: **14**]

52. *Phase Transitions* **8**, 66-68 (1986), *Krishna Kumar*, Jayanta K. Bhattacharjee, and Kalyan Banerjee; "Onset of hydrodynamic instability under external modulation of control parameters". [DOI: https://doi.org/10.1080/01411598608215416, Taylor & Francis Group, Impact Factor: 0.954]

53. *J. Phys. A* **19** (14), L835-L839 (1986), Jayanta K. Bhattacharjee, Kalyan Banerjee, and *Krishna Kumar*; "Modulated Taylor-Couette flow as a dynamical system". [DOI: https://doi.org/10.1088/0305-4470/19/14/003, IOP, Impact Factor: 1.933, Citations: **6**]

Other Articles as chapters of books/ reports:

54. *"Zero-Prandt-number convection"* by Krishna Kumar, Technical Report, Woods Hole Oceanographic Institution, U. S. A. (1991).

55. *"Self-tuned chaos from a fixed point in a flow system"* by *Krishna Kumar*, Pinaki Pal, and Alaka Das in Proceedings of National Conference on Nonlinear Systems & Dynamics, 2003.

56. *"Random bursts in flow energy in a model of convection"* by *Krishna Kumar*, Pinaki Pal, and Stephan Fauve in Proceedings of National Conference on Nonlinear Systems & Dynamics, 2006.

57. *"Large-scale behavior of Turbulent Convection Governed by Low-dimensional Fixed-points"* by M. K. Verma, J.J. Nielema, *K. Kumar*, S. Paul and D. Carati in *Advances in Turbulence XI*, (ETC-11, Porto), p. 609-611 (2007), Springer (Eds.: J. M. L. M. Palma and A. Silva Lopes).

58. *"A model for flow reversal in two-dimensional convection"* by *Krishna Kumar*, S. Pal and M.K. Verma in *Recent Developments in Theoretical Physics, Statistical Physics and Interdisciplinary Research* , Vol. **9**, p.365-173 (2010), World Scientific (Eds.: S. Ghosh and G. Kar).

Link to ResearchGate: *https://www.researchgate.net/profile/Krishna_Kumar55*
Google Scholar Citations: *https://scholar.google.co.in/citations?user=IxB0YjcAAAAJ*