

Curriculum Vitae

Devang V. Khakhar

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Personal

Date of Birth 7 April 1959

Academic qualifications

B.Tech. Chemical Engineering, 1981, Indian Institute of Technology, Delhi, India
Ph.D. Chemical Engineering, 1986, University of Massachusetts, Amherst, U.S.A.

Experience :

Jul 2024 - present	Emeritus Fellow, Department of Chemical Engineering, Indian Institute of Technology Bombay.
Jul 1996 - Jun 2024	Professor, Department of Chemical Engineering, Indian Institute of Technology Bombay.
Jan 2009 - Apr 2019	Director, Indian Institute of Technology Bombay.
Jul 2005 - Dec 2008	Dean (Faculty), Indian Institute of Technology Bombay.
Jul 2002 - Dec 2004	Head, Department of Chemical Engineering, Indian Institute of Technology Bombay.
Jun 2001 - Jun 2002	Professor in Charge, Continuing Education, Indian Institute of Technology Bombay.
Jan 1996 - Jun 1996	Visiting Faculty, Department of Chemical Engineering, Northwestern University, Evanston
Nov 1990 - Jun 1996	Associate Professor, Department of Chemical Engineering, Indian Institute of Technology, Bombay.
Dec 1987 - Oct 1990	Assistant Professor, Department of Chemical Engineering, Indian Institute of Technology Bombay.
Jan 1987 - Nov 1987	Lecturer, Department of Chemical Engineering, Indian Institute of Technology Bombay.
May 86 - Nov 86	Visiting Assistant Professor, Department of Chemical Engineering, Indian Institute of Technology, Kanpur.

Research interests

- *Particulate systems*: Modelling and experiments of particulate solids flow and mixing in rotating cylinders and gas fluidized beds. Rheology of suspensions with complex media.
- *Polymerization of rigid rodlike molecules*: Diffusion controlled polymerization kinetics, dynamics and orientation of rodlike polymers under flow, Brownian dynamics simulations of polymerization.
- *Polyurethane foams*: Modelling and experiments of foaming dynamics. Structure-property relations for foams.
- *Fluid mixing*: Chaotic advection, drop breakup and coalescence in viscous liquids.

Awards and Honours

- Amar Dyechem Award for “Excellence in Research and Development for a Chemical Engineer below the age of 35 years”, Indian Institute of Chemical Engineers, 1993.
- Fellow, Indian Academy of Sciences, Bangalore, December 1996.
- Shanti Swarup Bhatnagar Prize, Engineering Sciences, Council for Scientific and Industrial Research, 1997.
- Swarnajayanti Fellowship, Department of Science and Technology, 1998.
- Herdillia Award for “Excellence in Basic Research”, Indian Institute of Chemical Engineers, 1999.
- Fellow, Indian National Academy of Engineering, 2001.
- Excellence in Teaching Award, IIT Bombay, 2001.
- Fellow, Indian National Science Academy, 2002.
- Prof. H. H. Mathur Award for Research Excellence in Applied Sciences, IIT Bombay, 2005.
- Indira Manudhane Best Post Graduate Teacher Award, Chemical Engineering Department, IIT Bombay, 2005.
- Distinguished Alumnus Award, IIT Delhi, 2008.
- Fellow, National Academy of Sciences, India, 2010
- J. C. Bose Fellowship, DST, 2010.
- H. K. Firodia Award, 2014.
- ICC D. M. Trivedi Lifetime Achievement Award for contribution to Indian Chemical Industry (Research and Education), 2016.
- Honorary Doctorate, Monash University, Australia, June 2019.
- Institute Chair Professorship, IIT Bombay, 2021.
- INAE Chair Professorship, INAE, 2022.
- Prof. S. C. Sahasrabudhe Lifetime Achievement Award, IIT Bombay, 2023.

Archival publications

1. K. Vishwanathan, D. V. Khakhar, and D. Subba Rao, Fluidised bed absorber modelling and experimental study, *Chem. Eng. Commun.*, **20**, 235-251 (1983).
2. D. V. Khakhar and J. M. Ottino, Deformation and breakup of slender drops in linear flows, *J. Fluid Mech.*, **166**, 265-285 (1986).
3. D. V. Khakhar, H. Rising and J. M. Ottino, Analysis of chaotic mixing in two model flows *J. Fluid Mech.*, **172**, 419-451 (1986).

4. D. V. Khakhar and J. M. Ottino, A note on the linear vector model of Olbricht, Rallison and Leal as applied to the breakup of slender drops *J. Non-Newtonian Fluid Mech.*, **21**, 127-131 (1986).
5. D. V. Khakhar and J. M. Ottino, Fluid mixing in periodic sequences of bounded weak flows *Phys. of Fluids*, **29**, 3503-3505 (1986).
6. D. V. Khakhar and J. M. Ottino, Breakup of liquid threads in linear flows, *Int. J. Multiphase Flow*, **13**, 71-86 (1987).
7. D. V. Khakhar, J. G. Franjione and J. M. Ottino, A case study of chaotic mixing in deterministic flows : the partitioned-pipe mixer, *Chem. Eng. Sci.*, **42**, 2909-2926 (1987).
8. M. R. Thatte, N. B. Kamdar, D. V. Khakhar, M. A. Varade and R. L. Thatte, Static and dynamic computerized radioactive tracer studies, vital dye staining and theoretical mathematical calculations to ascertain the mode of survival of single cephalad channel venous island flaps, *Brit. J. Plastic Surgery*, **49** 405-413 (1989).
9. U. R. Bidkar and D. V. Khakhar, Collision rates in a chaotic flow: dilute suspensions, *Phys. Rev. A.*, **42**, 5964-5969 (1990).
10. S. Das Gupta, S. K. Bhatia and D. V. Khakhar, Axial transport of granular solids in horizontal rotating cylinders. Part 1: Theory, *Powder Technol.*, **67**, 145-151 (1991).
11. S. J. Rao, D. V. Khakhar and S. K. Bhatia, Axial transport of granular solids in rotating cylinders. Part 2: Experiments in a non-flow system, *Powder Technol.*, **67**, 153-162 (1991).
12. S. Das Gupta, D. V. Khakhar and S. K. Bhatia, Axial segregation of particles in a horizontal rotating cylinder, *Chem. Eng. Sci.*, **46**, 1513-1517 (1991).
13. U. S. Agarwal and D. V. Khakhar, Diffusion limited polymerization of rigid rodlike molecules: Dilute solutions, *J. Chem. Phys.*, **96**, 7125-7134 (1992).
14. U. S. Agarwal and D. V. Khakhar, Enhancement of polymerization rates of rigid rodlike polymers by shearing, *Nature*, **360**, 53-55 (1992).
15. K. C. Khilar, D. V. Khakhar and P. K. Ghosh, Reduction in gravity induced collision frequencies of particles dispersed in a viscoplastic fluid, *J. Colloid Interface Sci.*, **153**, 578-580 (1992).
16. S. A. Baser and D. V. Khakhar, A simple method for studying the dynamics of rigid polyurethane foam formation, *J. Cellular Plast.*, **29**, 280-284 (1993).
17. U. S. Agarwal and D. V. Khakhar, Diffusion limited polymerization of rigid rodlike molecules: Semi-dilute solutions, *J. Chem. Phys.*, **99**, 1382-1392 (1993).
18. U. S. Agarwal and D. V. Khakhar, Simulation of diffusion limited step-growth polymerization in 2-d: Effect of shear flow and chain rigidity, *J. Chem. Phys.*, **99**, 3067-3074 (1993).
19. U. S. Agarwal and D. V. Khakhar, Orientation development during solution polymerization of rigid rodlike molecules, *Macromolecules*, **26**, 3960-3965 (1993).
20. D. V. Khakhar and U. S. Agarwal, Competition effects in surface diffusion controlled reactions: Theory and Brownian dynamics simulations, *J. Chem. Phys.*, **99**, 9237-9247 (1993).
21. S. A. Baser, D. G. Shetty and D. V. Khakhar, Jet impingement mixing in an L-type mixhead: Comparison of mixing criteria, *Polym. Eng. Sci.*, **33**, 1611-1618 (1993).
22. S. A. Baser and D. V. Khakhar, Castor oil-glycerol blends as polyols for rigid polyurethane foams, *Cellular Polym.*, **12**, 390-401 (1993).
23. S. A. Baser and D. V. Khakhar, Modeling of the dynamics for R-11 blown polyurethane foam formation, *Polym. Eng. Sci.*, **34**, 632-641 (1994).
24. S. A. Baser and D. V. Khakhar, Modeling of the dynamics for water and R-11 blown polyurethane foam formation, *Polym. Eng. Sci.*, **34**, 642-649 (1994).
25. D. V. Khakhar and K. V. Joseph, Optimization of the structure of integral skin foams for maximal flexural properties, *Polym. Eng. Sci.*, **34**, 726-733 (1994).

26. S. V. Shouche, D. K. Chokappa, V. M. Naik and D. V. Khakhar, Effect of particulate fillers on the rheology of a lyotropic gel medium, *J. Rheol.*, **36**, 1871-1884 (1994).
27. P. Anjaneyulu and D. V. Khakhar, Rheology of a gas fluidized bed, *Powder Technol.*, **83**, 29-34 (1995).
28. D. V. Khakhar, J. J. McCarthy, T. Shinbrot and J. M. Ottino, Transverse flow and mixing of granular materials in a rotating cylinder, *Phys. Fluids*, **9**, 31-43 (1997).
29. Y. Makwana, K. M. Moudgalya, D. V. Khakhar, Modeling of industrial styrene polymerization reactors, *Polym. Eng. Sci.*, **37**, 1073-1081 (1997).
30. Susheela Bai, D. V. Khakhar and V. M. Nadkarni, Mechanical properties of simultaneous interpenetrating polymer networks of castor oil polyurethane and polystyrene, *Polymer*, **38**, 4319-4323 (1997).
31. T. Shinbrot, D. V. Khakhar, J. J. McCarthy and J. M. Ottino, A simple model for granular convection, *Phys. Rev. Lett.*, **79**, 829-832 (1997).
32. T. Shinbrot, D. V. Khakhar, J. J. McCarthy and J. M. Ottino, Role of voids in granular convection, *Phys. Rev. E*, **55**, 6121-6133 (1997).
33. J. S. Gupta and D. V. Khakhar, Brownian dynamics simulation of diffusion controlled reactions with finite surface reactivity, *J. Chem. Phys.*, **107**, 1915-1921 (1997).
34. J. S. Gupta and D. V. Khakhar, Brownian dynamics simulation of the polymerization of rodlike molecules: isotropic translational diffusion, *J. Chem. Phys.*, **107**, 3289-3294 (1997).
35. N. Y. Vaidya and D. V. Khakhar, Flexural properties of mica filled polyurethane foams, *J. Cellular Plast.*, **33**, 587-605 (1997).
36. D. V. Khakhar, J. J. McCarthy and J. M. Ottino, Radial segregation of granular mixtures in a rotating cylinder, *Phys. Fluids*, **9**, 3600-3614 (1997).
37. K. S. Lim, D. V. Khakhar, Z. Chen and P. K. Agarwal, Raining of particles from an emulsion-gas interface in a fluidized bed, *Chem. Eng. Commun.*, **161**, 205-229 (1997).
38. J. S. Gupta and D. V. Khakhar, Brownian dynamics simulation of the polymerization of rodlike molecules: anisotropic translational diffusion, *J. Chem. Phys.*, **108**, 5626-5634 (1998).
39. G. Pulla Reddy, D. K. Chokappa, V. M. Naik and D. V. Khakhar, Structure formation in suspensions with a liquid crystalline medium: Percolation phenomena, *Langmuir*, **14**, 2541-2547 (1998).
40. S. Hansen, D. V. Khakhar and J. M. Ottino, Dispersion of solids in nonhomogeneous viscous flows, *Chem. Eng. Sci.*, **53**, 1803-1817 (1998).
41. D. V. Khakhar, Manufacture of ultra strong polymer fibres: the polymerization step, *J. Sci. Ind. Res.*, **57**, 429-440 (1998).
42. G. O. Fountain, D. V. Khakhar and J. M. Ottino, 3D chaos visualized, *Science*, **281**, 683-686 (1998).
43. S. S. Manna and D. V. Khakhar, Internal avalanches in a granular medium, *Phys. Rev. E*, **58**, R6935-R6938 (1998).
44. V. Gupta and D. V. Khakhar, Formation of integral skin polyurethane foams, *Polym. Eng. Sci.*, **39**, 164-176 (1999).
45. D. V. Khakhar, J. J. McCarthy, J. F. Gilchrist and J. M. Ottino, Chaotic Mixing of Granular Materials in 2D Tumbling Mixers, *CHAOS*, **9**, 195-205 (1999).
46. D. V. Khakhar, J. J. McCarthy and J. M. Ottino, Mixing and segregation of granular materials in chute flow, *CHAOS*, **9**, 594-610 (1999).
47. A. Nandi, A. Mehra and D. V. Khakhar, Suppression of coalescence in surfactant stabilized emulsions by shear flow, *Phys. Rev. Lett.*, **83**, 2461-2464 (1999).

48. K. M. Hill, J. F. Gilchrist, D. V. Khakhar, J. J. McCarthy, and J. M. Ottino, Mixing of Granular Materials: A Test-Bed Dynamical System for Pattern Formation, *Intern. J. Bifurc. Chaos*, **9**, 1467-1484, (1999) (cover article).
49. K. M. Hill, D. V. Khakhar, J. F. Gilchrist and J. M. Ottino, Segregation driven organization in chaotic granular flows, *Proc. Nat. Acad. Sci.*, **96**, 11701-11706 (1999) (cover article).
50. J. J. McCarthy, D. V. Khakhar and J. M. Ottino, A computational study of granular mixing, *Powder Technol.*, **109**, 72-82 (2000).
51. J. M. Ottino and D. V. Khakhar, Mixing and segregation of granular materials, *Ann. Rev. Fluid Mech.*, **32**, 55-91 (2000).
52. A. Swaminathan and D. V. Khakhar, Rigid polyurethane foams for buoyancy applications: Hydraulic resistance, *Cellular Polym.*, **19**, 1-11 (2000).
53. G. O. Fountain, D. V. Khakhar and J. M. Ottino, Chaotic mixing in a bounded three-dimensional flow, *J. Fluid Mech.*, **417**, 265-301 (2000).
54. A. Agge, S. Jain and D. V. Khakhar Acceleration of the polymerization of rodlike molecules by flow, *J. Am. Chem. Soc.*, **122**, 10910-10913 (2000).
55. J. Srinivasalu Gupta, A. Agge and D. V. Khakhar, Polymerization kinetics of rodlike molecules under quiescent conditions, *AIChE J.*, **47**, 177-186 (2001).
56. S. Jain, A. Agge and D. V. Khakhar, Flow enhanced diffusion-limited polymerization of rodlike molecules, *J. Chem. Phys.*, **114**, 553-560. (2001).
57. N. Jain, D. V. Khakhar, R. M. Lueptow and J. M. Ottino, Self-Organization in granular slurries, *Phys. Rev. Lett.* **86**, 3771-3774 (2001).
58. D. V. Khakhar, A. Orpe and J. M. Ottino, Continuum model of mixing and size segregation in a rotating cylinder: Concentration-flow coupling and streak formation, *Powder Technol.*, **116**, 234-247 (2001).
59. A. Nandi, D. V. Khakhar and A. Mehra, Coalescence in surfactant stabilized emulsions subjected to a shear flow, *Langmuir*, **17**, 2647-2655 (2001).
60. P. DeRoussel, D. V. Khakhar and J. M. Ottino, Mixing of viscous immiscible liquids. Part 1: Computational models for strong weak and continuous flow systems, *Chem. Eng. Sci.*, **56**, 5511-5529 (2001)
61. P. DeRoussel, D. V. Khakhar and J. M. Ottino, Mixing of viscous immiscible liquids. Part 2: Overemulsification interpretation and use, *Chem. Eng. Sci.*, **56**, 5531-5537 (2001)
62. D. V. Khakhar, A. V. Orpe, P. Andrésén and J. M. Ottino, Heap formation in quasi 2d flows, *J. Fluid Mech.*, **441**, 255-264, (2001).
63. A. V. Orpe, and D. V. Khakhar, Scaling relations for granular flow in quasi-two-dimensional rotating cylinders, *Phys. Rev. E*, **64**, 031302 (2001).
64. J. M. Ottino and D. V. Khakhar, Fundamental research in heaping, mixing and segregation of granular materials: challenges and perspectives, *Powder Technol.*, **121**, 117-122 (2001).
65. D. V. Khakhar, A. V. Orpe and J. M. Ottino, Surface granular flows: Two related examples, *Adv. Complex Sys.*, **4**, 1-11 (2001).
66. J. M. Ottino and D. V. Khakhar, Scaling of granular flow processes: from surface flows to design rules, *AIChE J.*, **48**, 2157-2166, (2002).
67. J. M. Ottino and D. V. Khakhar, Open problems in active chaotic flows: Competition between chaos and order in granular materials, *CHAOS*, **12**, 400-407 (2002).
68. D. V. Khakhar, A. V. Orpe and S. K. Hajra, Segregation of granular materials in rotating cylinders, *Physica A*, **318**, 129-136, (2003).

69. S. K. Hajra and D. V. Khakhar, Sensitivity of granular segregation of mixtures in quasi-two-dimensional fluidized layers, *Phys. Rev. E*, **69**, 031304 (2004)
70. P. Mondal and D. V. Khakhar, Hydraulic resistance of rigid polyurethane foams: 1. Effect of different surfactants on foam structure and properties, *J. Appl. Polym. Sci.*, **93**, 2821-2829 (2004).
71. P. Mondal and D. V. Khakhar, Hydraulic resistance of rigid polyurethane foams: 2. Effect of variation of surfactant, water and nucleating agent concentrations on foam structure and properties, *J. Appl. Polym. Sci.*, **93**, 2830-2837 (2004).
72. P. Mondal and D. V. Khakhar, Hydraulic resistance of rigid polyurethane foams: 3. Effect of variation of the concentration of the catalysts on foam structure and properties, *J. Appl. Polym. Sci.*, **93**, 2838-2843 (2004).
73. P. Mondal and D. V. Khakhar, Regulation of cell structure in water blown rigid polyurethane foam, *Macromolecular Symp.*, **216**, 241-254 (2004).
74. A. V. Orpe, and D. V. Khakhar, Solid-liquid transition in a granular shear flow, *Phys. Rev. Lett.*, **93**, 068001 (2004).
75. S. K. Hajra and D. V. Khakhar, Radial mixing of granular materials in a rotating cylinder: Experimental determination of particle self-diffusivity, *Phys. Fluids*, **17**, 013101 (2005).
76. A. Nandi, A. Mehra and D. V. Khakhar, Coalescence in a surfactant-less emulsion under simple shear flow, *AIChE J.*, **52**, 885-894 (2006).
77. P. Mondal and D. V. Khakhar, Simulation of the percolation of water into rigid polyurethane foams at applied hydraulic pressures, *Polym. Eng. Sci.*, 970-983 (2006).
78. G. Harikrishnan, T. Umasankar Patro, and D. V. Khakhar, Polyurethane Foam-Clay Nanocomposites: Nanoclays as Cell Openers, *Ind. Eng. Chem. Res.*, **45**, 7126-7134 (2006).
79. A. V. Orpe and D. V. Khakhar, Rheology of surface granular flows, *J. Fluid Mech.*, **571**, 1-32 (2007).
80. P. Mondal and D. V. Khakhar, Rigid polyurethane-clay nanocomposite foams: preparation and properties, *J. Appl. Polym. Sci.*, **103**, 2803-2809 (2007).
81. G. Harikrishnan, T. Umasankar Patro and D. V. Khakhar, Reticulated vitreous carbon from polyurethane foam-clay composites, *Carbon*, **45**, 531-535 (2007).
82. G. Harikrishnan and D. V. Khakhar, Effect of monomer temperature on foaming and properties of flexible polyurethane foam, *J. Appl. Polym. Sci.*, **105**, 3439-3443 (2007).
83. M. V. Mhalgi, D. V. Khakhar and A. Misra, Stretching induced phase transformations in melt extruded poly(vinylidene fluoride) cast films: Effect of cast roll temperature and speed, *Polym. Eng. Sci.*, **47**, 1992-2004 (2007).
84. D. V. N. Prasad and D. V. Khakhar, Granular flow in rotating cylinders with noncircular cross sections, *Phys. Rev. E*, **77**, 041301 (2008).
85. S. Sarkar and D. V. Khakhar, Experimental evidence for a description of granular segregation in terms of the effective temperature, *Europhys. Lett.*, **83** 54004 (2008).
86. T. Umasankar Patro, M. V. Mhalgi, D. V. Khakhar and Ashok Misra, Studies on poly(vinylidene fluoride)-clay nanocomposites: Effect of different clay modifiers, *Polymer*, **49**, 3486-3499 (2008).
87. T. Umasankar Patro, D. V. Khakhar and Ashok Misra, Phosphonium-based layered silicate - Poly(ethylene terephthalate) nanocomposites: Stability, thermal and mechanical properties, *J. Appl. Polym. Sci.*, **113**, 1720-1732 (2009).
88. A. Tripathi and D. V. Khakhar, Steady flow of smooth, inelastic particles on a bumpy inclined plane: Hard and soft particle simulations, *Phys. Rev. E*, **81**, 041307 (2010).
89. G. Harikrishnan and D. V. Khakhar, Modeling the dynamics of reactive foaming and film thinning in polyurethane foams, *AIChE J.*, **56**, 522-530 (2010).

90. Vijayakumar R. P., D. V. Khakhar and A. Misra, Studies on α to β phase transformation in mechanically deformed PVDF films, *J. Appl. Polym. Sci.*, **117**, 3491-3497 (2010).
91. D. V. N. Prasad and D. V. Khakhar, Mixing of granular material in rotating cylinders with non-circular cross-sections, *Phys. Fluids*, **22**, 103302 (2010).
92. G. Harikrishnan, T. Umasankar Patro, A. R. Unni and D. V. Khakhar, Clay nanoplatelet induced morphological evolutions during polymeric foaming, *Soft Matter*, **7**, 6801-6804 (2011).
93. D. V. Khakhar, Rheology and mixing of granular materials, *Macromol. Mater. Eng.*, **296**, 278-289 (2011).
94. A. Seth Mehrotra, S. Puri and D. V. Khakhar, Gradient Monte Carlo simulations: Hard spheres in spatially varying temperature and gravitational fields, *Phys. Rev. E*, **83**, 061306 (2011).
95. S. K. Hajra and D. V. Khakhar, Radial segregation of ternary granular mixtures in rotating cylinders, *Granular Matter*, **13**, 475-486 (2011).
96. A. Tripathi and D. V. Khakhar, Numerical simulation of the sedimentation of a sphere in a sheared granular fluid: A granular Stokes experiment, *Phys. Rev. Lett.*, **107**, 108001 (2011).
97. Vijayakumar R. P., A. Misra and D. V. Khakhar, Phase Transformation and Enhancement of Toughness in Polyvinylidene Fluoride by Onium Salts, *J. Poly. Sci. B Poly. Phys.*, **49**, 18, 1339-1344 (2011).
98. A. Tripathi and D. V. Khakhar, Rheology of binary granular mixtures in the dense flow regime, *Phys. Fluids*, **23**, 113302 (2011).
99. A. Seth Mehrotra, S. Puri and D. V. Khakhar, Field induced gradient simulations: A high throughput method for computing chemical potentials in multicomponent systems, *J. Chem. Phys.*, **136**, 134108 (2012).
100. S. K. Rath, M. Patri, and D. V. Khakhar, Structure-thermomechanical property correlation of moisture cured poly(urethane-urea)/clay nanocomposite coatings, *Progress in Organic Coatings*, **75**, 264-273 (2012).
101. A. Tripathi and D. V. Khakhar, Density difference-driven segregation in a dense granular flow, *J. Fluid Mech.*, **717**, 643-669 (2013).
102. S. K. Tiwari, A. Misra and D. V. Khakhar, Benzyl triphenyl phosphonium chloride as an additive for polyvinylidene fluoride: Melt rheology, crystallization and electrical properties, *Polymer Eng. Sci.*, **54**, 2420-2429 (2014).
103. S. K. Rath, V. K. Aswal, C. Sharma, K. Joshi, M. Patri, G. Harikrishnan and D. V. Khakhar, Mechanistic origins of multi-scale reinforcements in segmented polyurethane-clay nanocomposites, *Polymer*, **55**, 5198-5210 (2014).
104. S. H. Gharat and D. V. Khakhar, Experimental investigation of coke collapse in quasi-two dimensional system for a blast furnace. *Procedia Engineering*, **102**, 676-683 (2015).
105. S. K. Rath, K. Sudarshan, R. S. Bhavsar, U. K. Kharul, P. K. Pujari, M. Patri and D. V. Khakhar, Characterizing the nanoclay induced constrained amorphous region in model segmented polyurethane-urea/clay nanocomposites and its implications on gas barrier properties, *Physical Chemistry Chemical Physics*, **18**, 1487-1499 (2016).
106. S. Mandal and D. V. Khakhar, A study of the rheology of planar granular flow of dumbbells using discrete element method simulations, *Phys. Fluids*, **28**, 103301 (2016).
107. B. Ravu, M. Rudman, G. Metcalfe, D. R. Lester and D. V. Khakhar, Creating analytically divergence-free velocity fields from grid-based data, *J. Computational Phys.*, **323**, 75-94 (2016).
108. S. Mandal and D. V. Khakhar, An experimental study of the flow of nonspherical grains in a rotating cylinder, *AIChE J.*, **63**, 4307-4315 (2017).
109. S. Mandal and D. V. Khakhar, Sidewall-friction-driven ordering transition in granular channel flows: Implications for granular rheology, *Phys. Rev. E*, **96**, 050901 (2017).

110. S. Mandal and D. V. Khakhar, A study of the rheology and micro-structure of dumbbells in shear geometries, *Phys. Fluids*, **30**, 013303 (2018).
111. S. K. Rath, J. Bahadur, H. S. Panda, D. Sen, T. U. Patro, S. Praveen, M. Patri and D. V. Khakhar, Anomalous toluene transport in model segmented polyurethane-urea/clay nanocomposites, *Soft Matter*, **14**, 3870-3881 (2018).
112. A. Bhateja and D. V. Khakhar, Rheology of dense granular flows in two dimensions: Comparison of fully two-dimensional flows to unidirectional shear flow, *Phys. Rev. Fluids*, **3**, 062301 (2018).
113. S. Mandal and D. V. Khakhar, Dense granular flow of mixtures of spheres and dumbbells down a rough inclined plane: Segregation and rheology, *Phys. Fluids*, **31**, 023304 (2019).
114. A. Pal and D. V. Khakhar, Breakage of vesicles in a simple shear flow, *Soft Matter*, **15**, 1979-1987 (2019).
115. S. Mandal and D. V. Khakhar, Granular surface flow on an asymmetric conical heap, *J. Fluid Mech.*, **865**, 41-59 (2019).
116. A. Pal, P. Sunthar and D. V. Khakhar, Effects of Ethanol Addition on the Size Distribution of Liposome Suspensions in Water, *Ind. Eng. Chem. Res.*, **58**, 7511-7519 (2019).
117. A. Kumar, D. V. Khakhar and A. Tripathi, Theoretical calculation of the buoyancy force on a particle in flowing granular mixtures, *Phys. Rev. E*, **100**, 042909 (2019)
118. A. Bhateja and D. V. Khakhar, Analysis of granular rheology in a quasi-two-dimensional slow flow by means of discrete element method based simulations, *Phys. Fluids*, **32**, 013301 (2020).
119. B. Ravu, G. Metcalfe, M. Rudman, D. R. Lester and D. V. Khakhar, Global organization of three-dimensional, volume-preserving flows: Constraints, degenerate points, and Lagrangian structure, *Chaos*, **30**, 033124 (2020).
120. N. Akiti, Y. S. Cheong, K. P. Hapgood and D. V. Khakhar, A study of wet granule breakage in a breakage-only high-shear mixer, *Adv. Powder Technol.*, **31**, 2438-2446 (2020).
121. M. M. Dhakate, J. B. Joshi, D. V. Khakhar, Analysis of grinding in a spiral jet mill. Part 1: Batch grinding, *Chem. Engng. Sci.*, **231**, 116310 (2021).
122. D. R. Vyas, S. J. Cummins, M. Rudman, P. W. Cleary, G. W. Delaney and D. V. Khakhar, Collisional SPH: A method to model frictional collisions with SPH, *Applied Mathematical Modelling*, **94**, 13-35 (2021)
123. S. Mireja and D. V. Khakhar, Free energy of conformational change in a single chain of polyvinylidene fluoride using molecular simulations, *Polym. Eng. Sci.*, **61**, 1270-1280 (2021)
124. A. Tripathi, A. Kumar, M. Nema and D. V. Khakhar, Theory for size segregation in flowing granular mixtures based on computation of forces on a single large particle, *Phys. Rev. E*, **103**, L031301 (2021)
125. M. M. Dhakate, J. B. Joshi, D. V. Khakhar, Analysis of grinding in a spiral jet mill. Part 2: Semi-batch grinding, *Chem. Engng. Sci.*, **253**, 117544 (2022).
126. M. M. Dhakate, J. B. Joshi, D. V. Khakhar, Influence of nozzle angle and classifier height on the performance of a spiral air jet mill, *Adv. Powder Technol.*, **33**, 103474 (2022).
127. D. R. Vyas, S. J. Cummins, M. Rudman, P. W. Cleary, G. W. Delaney and D. V. Khakhar, Collisional SPH: Elastoplastic frictional collisions with Collisional-SPH, *Tribology Int.*, **168**, 107438 (2022).
128. N. S. Ray and D. V. Khakhar, A method for coarse graining fluctuation velocities in granular flows, *Granular Matter*, **25**, 1–6, (2023).
129. A. V. Yennemadi and D. V. Khakhar, Drag, lift, and buoyancy forces on a single large particle in dense granular flows, *Phys. Rev. Fluids*, **8**, 074301, (2023)

130. M. M. Dhakate, A. Venkatraman and D. V. Khakhar, Breakage of a Single Particle in an Air Jet Mill, *ACS Engineering Au*, (2023).
131. S. Mireja and D. V. Khakhar, Methods to characterize the crystal polymorphs of polyvinylidene fluoride using Fourier transform infrared spectroscopy, *Polym. Eng. & Sci.*, **63**, 2857–2870, (2023).
132. A. Pal, D. Ray, V. K. Aswal and D. V. Khakhar, Effect of curvature on bilayer thickness of liposome suspensions in water, *Physica Scripta*, **98**, 115018, (2023).
133. M. M. Dhakate, J. B. Joshi, D. V. Khakhar, Effects of Diffusional Particle Motion on Size Classification in a Spiral Jet Mill, *I&EC Res.*, **62**, 19294–19301, (2023).
134. D. R. Vyas, S. J. Cummins, G. W. Delaney, M. Rudman and D. V. Khakhar, Modelling elastoplastic frictional collisions of ellipsoidal granules with collisional-SPH, *Adv. Powder Technol.*, **34**, 104028, (2023).
135. D. R. Vyas, S. J. Cummins, G. W. Delaney, M. Rudman and D. V. Khakhar, Modelling deformation effects in multiple collisions using Collisional-SPH, *Int. J. Solids Structures*, 112578, (2023).
136. S. Mireja and D. V. Khakhar, High β -phase PVDF films formed by uniaxial compression, *Polymer*, **293**, 126665, (2024).
137. R. K. Singh, D. Mukhopadhyay, D. V. Khakhar and J. B. Joshi, Estimation of turbulent energy mixing factor in PWR sub-channel by DNS, *Canadian J. Chem. Eng.*, **107**, 2628-2644 (2024).
138. R. K. Singh, D. Mukhopadhyay, D. V. Khakhar and J. B. Joshi, Estimation of Turbulent Mixing Factor and Study of Turbulent Flow Structures in PWR Sub Channel by DNS, *Journal of Nuclear Engineering and Radiation Science*, 1-43, (2024)
139. R. K. Singh, D. Mukhopadhyay, D. V. Khakhar and J. B. Joshi, Assessing turbulence models in PWR sub-channel geometry using q-DNS, *Nuclear Engineering and Design*, **425**, 113343 (2024).
140. R. K. Singh, D. Mukhopadhyay, D. Khakhar, and Joshi, J. B. "Estimation of Turbulent Mixing Factor and Study of Turbulent Flow Structures in Pressurized Water Reactor Sub Channel by Direct Numerical Simulation." *ASME J of Nuclear Rad Sci.* 11, 021001 (2025).
141. S. Mireja and D. V. Khakhar, Molecular simulation of the melting of PVDF crystal phases, *Computational Materials Science*, **150**, 113690 (2025).

Chapters in books

1. J. M. Ottino, P. deRousell, S. Hansen and D. V. Khakhar, Mixing and dispersion of viscous liquids and powdered solids, *Adv. Chem. Eng.*, vol. 25, pp.105-204, 1999.
2. D. V. Khakhar, Polymerization of rodlike molecules, Chapter in "Molecular Dynamics" edited by P. B. Balbuena and J. M. Seminario, Elsevier Publishers, pp. 785-828, 1999.

Major projects

1. Reaction injection moulding of polyurethane foams (1987, Department of Science and Technology, New Delhi).
2. Polyurethane integral skin foams: Fundamental studies and formulation development (1993, Department of Science and Technology, New Delhi).
3. Polymerization of aramid polymers under programmed shear flow conditions (1998, Naval Research Board, New Delhi).
4. Mixing and segregation of granular materials, Swarnajayanti Fellowship project, Department of Science and Technology, 1999.
5. Analysis of a Planetary Mixer, Central Manufacturing Technology Institute, 2001

6. Improved granular processing: Towards energy efficiency and waste utilization in the cement industry (2002, Council of Scientific and Industrial Research, New Delhi).
7. Open Cell Polyurethane Foams – Processing and Material Development (2005, Department of Science and Technology).
8. In-situ Synthesis of Vesicles in Microfluidic Devices for Bio-Medical Applications (2007, Department of Science and Technology).
9. Analysis and optimization of particle grinding in a spiral air jet mill (2020, SERB-CRG)
10. Rheology and dynamics of dense, turbulent fluid-solid flows (2021, SERB-SUPRA, ongoing)

Service

1. Member, Engineering Sciences Committee, CSIR Extramural Research: 1998-2001; 2004-2007; Chairman 2012-2015.
2. Member, Sectional Committee IV, Indian National Academy of Engineering, 2003-2005, 2014-present
3. Member, Sectional Committee, Indian National Science Academy, 2004-2007
4. Member, Research Council, Central Salt and Marine Chemicals Research Institute, Bhavnagar, 2004-2007
5. Member, Sectional Committee, Indian Academy of Science, 2004-2009
6. Member, Science and Engineering Research Council, Department of Science and Technology, 2007-2012.
7. Member, Programme Advisory Committee, Chemical Engineering, Department of Science and Technology, 2007-2010
8. Member, Research Council, National Interdisciplinary Institute of Science and Technology, 2007-2010
9. Member, Governing Council, Indian National Academy of Engineering, 2008-2013
10. Member, Governing Council, Indian Academy of Science, 2010-2012, 2025-2028
11. Member, Science Advisory Council to the Prime Minister, 2010-2013
12. Chairman, Research Council, Indian Institute of Petroleum, Dehra Dun, 2010-2015
13. Member, Science and Engineering Research Board, 2011-2014
14. Member, Atomic Energy Regulatory Board, 2011-present
15. Member, Scientific Advisory Committee to the Cabinet, 2012-2015
16. Member, Central Advisory Board of Education, 2012-2013
17. Independent Director, Indian Oil Corporation, 2012-2015
18. Independent Director, Antrix Corporation, 2013-2016
19. Chairman, Programme Advisory Committee, Chemical and Environmental Engineering, SERB, 2018-2024.
20. Vice President (Science and Society), Indian National Science Academy, Jan 2021-Dec 2023.
21. Chairman, Governing Body, Technology Information Forecasting and Assessment Council, Jan 2022-Jan 2025.
22. Member, Governing Body, Council for Scientific and Industrial Research, Mar 2023-Mar 2026.
23. Chairman, Governing Body, Bose Institute, Kolkata, Sept 2024-Sept 2027.