

个人详细履历

杨延涛

地址：北京市海淀区颐和园路 5 号北京大学工学院一号楼 313 室，邮编 100871

电子邮箱：yantao.yang@pku.edu.cn 办公电话：0086-10-62755285

课题组主页：http://www2.coe.pku.edu.cn/faculty/yangyantao/homepage_cn.html

工作经历

- 2023.08–至今：** 长聘副教授，北京大学工学院力学与工程科学系
湍流与复杂系统国家重点实验室
- 2017.05–2023.07：** 助理教授，北京大学工学院力学与工程科学系
湍流与复杂系统国家重点实验室
- 2013.05–2017.04：** 博士后，荷兰 Twente 大学 Physics of Fluids 课题组，荷兰 FOM 基金会
合作导师：Detlef Lohse 教授（德国科学院、荷兰皇家科学院院士，美国工程院外籍院士）
- 2011.04–2013.04：** “培源学者”博士后，北京大学应用物理与技术中心
合作导师：陈十一教授（中国科学院院士）
- 2009.07–2011.04：** 科研人员，北京大学湍流与复杂系统国家重点实验室

教育背景

- 2004.09–2009.07** 理学博士，北京大学工学院；专业：流体力学；导师：吴介之教授、李存标教授
- 2000.09–2004.07** 理学学士，北京大学力学与工程科学系；专业：理论与应用力学

研究领域

湍流、计算流体力学、海洋流体力学、血流动力学、流动控制

教学课程

- 本科生课程：《流体力学》（上、下），《工程流体力学》
- 研究生课程：《多相流》，《计算流体力学基础》，《湍流》

科研项目

- 青岛海洋科学与技术试点国家实验室“十四五”重大项目：海洋流体力学新型数值方法与物理模型，2022.05-2025.04。课题 2 负责人。项目总经费 811.6 万元，本人负责 258 万元。
- 国家自然科学基金“湍流结构的生成演化及作用机理”重大研究计划培育项目：带水平剪切的双扩散对流流动结构及输运特性，2019.01-2021.12。主持。项目经费 100 万元。
- 国家自然科学基金“湍流结构的生成演化及作用机理”重大研究计划重点项目：基于结构演化的可压缩湍流的约束大涡模拟研究，2018.01-2021.12。参与。项目经费 400 万元，本人负责 100 万元。
- 海外高层次人才计划青年项目，2018.01-2020.12。主持。300 万元
- 北京大学建设世界一流大学（学科）和特色发展引导专项（人才启动）：带标量场湍流数值模拟程序开发及海洋双扩散对流问题数值模拟研究，2017.05-2018.12。主持。项目经费 100 万元。

6. 北京大学临床医学 +X 青年专项：用于评估主动脉综合征转归的计算流体力学智能数字预警诊断模型体系的构建，2019.01-2019.12。共同主持人。项目经费 50 万元，本人负责 20 万元。
7. 欧洲 PRACE 项目：“Oceanic double diffusive convection in the diffusive regimes”，2019。Co-PI。项目资源 6000 万 CPU 小时。

期刊论文列表

(通讯作者由 * 标记，指导学生由下划线标记)

1. Y.N. Zhang, Y. Chen, Q.D. Cai, and **Y.T. Yang***. Numerical Simulation on the Scalar Transport in Rotating Channel Turbulence. *Physics of Gases*, **8**(5), 46-53, in Chinese. 2023.
2. J.Y. Li and **Y.T. Yang***. On the wall-bounded model of fingering double diffusive convection. *Journal of Fluid Mechanics*, **973**, A37. 2023.
3. J.Y. Du and **Y.T. Yang***. Effects of the gravitational force on the convection turbulence driven by heat-releasing point particles. *Physics of Fluids*, **35**, 075142. 2023.
4. C.L. Hu, K. Xu, and **Y.T. Yang***. Effects of the geothermal gradient on the convective dissolution in CO₂ sequestration. *Journal of Fluid Mechanics*, **963**, A23. 2023.
5. L.Q. Yuan, S.F. Zou, **Y.T. Yang***, and S.Y. Chen*. Boundary-layer disruption and heat-transfer enhancement in convection turbulence by oscillating deformations of boundary. *Physical Review Letters*, **130**, 204001. 2023.
6. W.Y. Chen, S.F. Zou, Q.D. Cai, and **Y.T. Yang***. An explicit and non-iterative moving-least-squares immersed-boundary method with low boundary velocity error. *Journal of Computational Physics*, **474**, 111803. 2023.
7. Y.H. Du and **Y.T. Yang***. Wall-bounded thermal turbulent convection driven by heat-releasing point particles. *Journal of Fluid Mechanics*, **953**, A41. 2022.
8. Y.W. Bin*, X.I.A. Yang, **Y.T. Yang**, R. Ni, and Y.P. Shi. Evolution of two counter-rotating vortices in a stratified turbulent environment. *Journal of Fluid Mechanics*, **951**, A47. 2022.
9. X.W. Qiu, S. Mao, J. Yin, and **Y.T. Yang***. An anisotropic immerse precipitation process for the preparation of polymer membranes. *Soft Matter*, **18**, 1525. 2022.
10. **杨延涛***. 盐指型双扩散湍流二维直接数值模拟研究. 空气动力学学报, **40**(2), 183-189. 2022.
11. Y.H. Du, M.Q. Zhang, and **Y.T. Yang***. Thermal convection driven by a heat-releasing scalar component. *Acta Mechanica Sinica*, **38**, 321584. 2022.
12. J.Y. Li and **Y.T. Yang***. Flow structures and vertical transport in tilting salt fingers with a background shear. *Physical Review Fluids*, **7**, 053501. 2022.
13. M. Mohasan, A.B. Aqeel, P.Y. Lv*, **Y.T. Yang***, and H.L. Duan. Droplet impact on wetted structured surfaces. *Applied Mathematics and Mechanics (English Edition)*, **43**(3), 437-446. 2022.
14. **Y.T. Yang***, R. Verzicco, D. Lohse and C.P. Caulfield*. Layering and vertical transport in sheared double-diffusive convection in the diffusive regime. *Journal of Fluid Mechanics*, **933**, A30. 2022.
15. Y.H. Du, M.Q. Zhang, and **Y.T. Yang***. Two-component convection flow driven by a heat-releasing concentration field. *Journal of Fluid Mechanics*, **929**, A35. 2021.
16. J.Y. Li and **Y.T. Yang***. Thermohaline interleaving induced by horizontal temperature and salinity gradients from above. *Journal of Fluid Mechanics*, **927**, A12. 2021.
17. S.F. Zou and **Y.T. Yang***. Realizing the ultimate scaling in convection turbulence by spatially decoupling the thermal and viscous boundary layers. *Journal of Fluid Mechanics Rapids*, **919**, R3. 2021.

18. M. Mohasan, A.B. Aqeel, P.Y. Lv*, **Y.T. Yang***, and H.L. Duan. Cavity dynamics of water drop impact onto immiscible oil pool with different viscosity. *Acta Mechanica Sinica*, **37**(3), 447-455. 2021
19. **Y.T. Yang***, W.Y. Chen, R. Verzicco, and D. Lohse. Multiple states and transport properties of double-diffusive convection turbulence. *PNAS*, **117**(26), 14676-14681. 2020
20. **Y.T. Yang***, R. Verzicco, D. Lohse, and R.J.A.M. Stevens. What rotation rate maximizes heat transport in rotating Rayleigh-Bénard convection with Prandtl number larger than one? *Physical Review Fluids*, **5**, 053501. 2020.
21. **Y.T. Yang***. Double diffusive convection in the finger regime for different Prandtl and Schmidt numbers *Acta Mechanica Sinica*, **36**, 797-804. 2020. (Cover of the issue)
22. A.B. Aqeel, M. Mohasan, P.Y. Lv*, **Y.T. Yang***, and H.L. Duan. Effects of the actuation waveform on the drop size reduction in drop-on-demand inkjet printing. *Acta Mechanica Sinica*. **36**(4), 797-804. 2020.
23. Z.Y. Liu **Y.T. Yang**, and Q.D. Cai*. Neural network as a function approximator and its application in solving differential equations. *Applied Mathematics and Mechanics (English Edition)*, **40**, 237-248. 2019.
24. A.B. Aqeel, M. Mohasan, P.Y. Lv*, **Y.T. Yang***, and H.L. Duan. Comprehensive effects of nozzle and fluid properties on the drop formation dynamics in a drop-on-demand inkjet printing. *Applied Mathematics and Mechanics (English Edition)*, **39**, 1-18. 2019.
25. **Y.T. Yang***, R. Verzicco, and D. Lohse. Two-scalar turbulent Rayleigh-Bénard convection: numerical simulations and unifying theory. *Journal of Fluid Mechanics*, **848**, 648-659. 2018.
26. X. Zhu*, E. Phillips, V. Spandan, J. Donners, G. Ruetsch, J. Romero, R. Ostilla-Mónico, **Y.T. Yang**, D. Lohse, R. Verzicco, M. Fatica, R.J.A.M. Stevens*. AFiD-GPU: A versatile Navier-Stokes solver for wall-bounded turbulent flows on GPU clusters. *Computer Physics Communications*, **229**, 199-210. 2018.
27. L. Bao, V. Spandan, **Y.T. Yang**, B. Dyett, R. Verzicco, D. Lohse, and X.H. Zhang*. Flow-induced dissolution of femtoliter surface droplet arrays. *Lab on a Chip*, **18**, 1066-1074. 2018.
28. K.L. Chong#, **Y.T. Yang#**, S.D. Huang, J.Q. Zhong, R.J.A.M. Stevens, R. Verzicco, D. Lohse, and K.Q. Xia*. Confined Rayleigh-Bénard, rotating Rayleigh-Bénard, and double diffusive convection: A unifying view on turbulent transport enhancement through coherent structure manipulation. *Physical Review Letters*, **119**, 064501. 2017. (#Co-first authors)
29. **Y.T. Yang***, R. Verzicco, and D. Lohse. Vertically Bounded Double Diffusive Convection in the Finger Regime: Comparing No-Slip versus Free-Slip Boundary Conditions. *Physical Review Letters*, **117**, 184501. 2016. (Cover of the issue)
30. **Y.T. Yang***, R. Verzicco, and D. Lohse. Scaling laws and flow structures of double diffusive convection in the finger regime. *Journal of Fluid Mechanics*, **802**, 667-689. 2016.
31. **Y.T. Yang***, R. Verzicco, and D. Lohse. From convection rolls to finger convection in double-diffusive turbulence. *PNAS*, **113**(1), 69-73. 2016.
32. **Y.T. Yang**, J.C. Wang, Y.P. Shi*, Z.L. Xiao, X.T. He, and S.Y. Chen. Intermittency caused by compressibility: A Lagrangian study. *Journal of Fluid Mechanics Rapids*, **786**, R6. 2016.
33. **Y.T. Yang***, E. P. van der Poel, R. Ostilla-Mónico, C. Sun, R. Verzicco, S. Grossmann and D. Lohse. Salinity transfer in bounded double diffusive convection. *Journal of Fluid Mechanics*, **768**, 476-491. 2015.
34. **Y.T. Yang***, R. Ostilla-Mónico, J. Z. Wu, and P. Orlandi. Inertial waves and mean velocity profiles in a rotating pipe and a circular annulus with axial flow. *Physical Review E*, **91**, 013015. 2015.
35. R. Ostilla-Mónico##, **Y.T. Yang#**, E. P. van der Poel, D. Lohse, and R. Verzicco. A multiple-resolution strategy for Direct Numerical Simulation of scalar turbulence. *Journal of Computational Physics*, **301**, 308-321. 2015. (#Co-first authors)

36. S.Y. Chen*, Z.H. Xia, J.C. Wang, and **Y.T. Yang**. Recent progress in compressible turbulence. *Acta Mechanica Sinica*, **31**, 275-291. 2015.
37. **Y.T. Yang**, J.C. Wang, Y.P. Shi*, Z.L. Xiao, X.T. He, and S.Y. Chen. Interactions between inertial particles and shocklets in compressible turbulent flow. *Physics of Fluids*, **26**, 091702. 2014.
38. D. Li, S. Li, Y. Xue, **Y.T. Yang**, W. Su, Z. Xia, Y. Shi, H. Lin*, and H. Duan*. The effect of slip distribution on flow past a circular cylinder. *Journal of Fluids and Structures*, **51**, 211-224. 2014.
39. **Y.T. Yang**, J.C. Wang, Y.P. Shi*, Z.L. Xiao, X.T. He, and S.Y. Chen*. Acceleration of Passive Tracers in Compressible Turbulent Flow. *Physical Review Letters*, **110**, 064503. 2013.
40. J.C. Wang, **Y.T. Yang**, Y.P. Shi*, Z.L. Xiao, X.T. He, and S.Y. Chen*. Cascade of kinetic energy in three-dimensional compressible turbulence. *Physical Review Letters*, **110**, 214505. 2013.
41. J.C. Wang, **Y.T. Yang**, Y.P. Shi*, Z.L. Xiao, X.T. He, and S.Y. Chen*. Statistics and structures of pressure and density in compressible isotropic turbulence. *Journal of Turbulence*, **14**:6, 21-37. 2013.
42. **Y.T. Yang*** and J.Z. Wu. Channel turbulence with spanwise rotation studied using helical wave decomposition. *Journal of Fluid Mechanics*, **692**, 137-152. 2012.
43. S.Y. Chen, Z.H. Xia, S.Y. Pei, J.C. Wang, **Y.T. Yang**, Z.L. Xiao, and Y.P. Shi*. Reynolds-stress-constrained large eddy simulation of wall-bounded turbulent flows. *Journal of Fluid Mechanics*, **703**, 1-28. 2012.
44. **Y.T. Yang***, W.D. Su, and J.Z. Wu. Helical-wave decomposition and applications to channel turbulence with streamwise rotation. *Journal of Fluid Mechanics*, **662**, 91-122. 2010.
45. **Y.T. Yang**, H. Wu, Q.S. Li, S. Zhou, and J.Z. Wu*. Vorticity Dynamics in axial compressor flow diagnosis and design. *Journal of Fluid Engineering*, **130**, 041102. 2008.
46. 吴介之*, 杨延涛. 绕刚体的分离涡流到绕柔体的受控势流. 空气动力学学报, **26**(z1), 21-27. 2008.
47. **Y.T. Yang**, R.K. Zhang, Y.R. An, and J.Z. Wu*. Steady vortex force theory and slender-wing flow diagnosis. *Acta Mechanica Sinica*, **23**, 609-619. 2007.
48. J.Z. Wu, A.K. Xiong, and **Y.T. Yang**. Response to “Comment on ‘Axial stretching and vortex definition’”. *Physics of Fluids*, **18**, 029102. 2006.
49. J.Z. Wu*, **Y.T. Yang**, Y.B. Luo, and C. Pozrikidis. Fluid kinematics on a deformable surface. *Journal of Fluid Mechanics*, **541**, 371-381. 2005.
50. J.Z. Wu*, A.K. Xiong, and **Y.T. Yang**. Axial stretching and vortex definition. *Physics of Fluids*, **17**, 038108. 2005.

会议报告

1. Oceanic thermohaline double diffusive convection. *International Symposium on Turbulence - in Memory of Chou Pei-Yuan's 120th Anniversary of Birth*. August 2022, Virtual Meeting.
2. On the wall-bounded model of double diffusive convection in the fingering regime. *Euromech Colloquium 619*. July 2022, Virtual Meeting.
3. 海洋双扩散湍流中的分层与多态现象。北京力学会第二十八届学术年会，2022.01，北京，邀请报告。
4. 湍流混合与输运研究进展。湍流与非线性力学研讨会，2021.12，北京。
5. An explicit and non-iterative moving-least-squares immersed boundary method with low boundary error. *The 21st IACM Computational Fluids Conference*. October 2021, Hangzhou, China.

6. Vortical structures and heat transfer enhancement in rotating Rayleigh-Bénard convection. *The 25th International Congress of Theoretical and Applied Mechanics*. August 2021, Virtual Meeting.
7. 旋转槽道湍流标量场输运特性直接数值模拟研究。第十九届全国计算流体力学会议, 2021.06, 南京, 主题邀请报告。
8. 极地海洋扩散型温盐台阶流态数值模拟研究。湍流专题研讨会, 2021.05, 上海。
9. Layering and vertical mixing in double diffusive convection turbulence. *BICTAM-CISM Symposium on Dispersed Multiphase Flows: from Measuring to Modeling*. March 2021, Beijing, China.
10. 带剪切作用的海洋扩散型温盐驱动对流湍流。第十一届全国流体力学学术会议, 2020.12, 深圳。
11. Layering in oceanic double diffusive convection turbulence. 湍流与非线性力学研讨会, 2019.12, 北京。
12. Numerical simulation of multi-component stratification flows. *International Symposium on High-Fidelity Computational Methods & Applications 2019*. December 2019, Shanghai, China.
13. Layering and vertical transport in sheared double diffusive convection in the diffusive regime. *The 17th European Turbulence Conference of Euromech*. September 2019, Torino, Italy.
14. 高 Schmidt 数标量场流动直接数值模拟。第十九届全国流体力学数值方法研讨会, 2019.07, 张掖。
15. Helical wave decomposition and its applications in wall turbulence. *The 8th International Symposium on Physics of Fluids*. June 2019, Xi'an, China.
16. 双扩散对流。第十一届全国流体力学青年研讨会。2019.05, 合肥。
17. 带水平剪切的双扩散对流流动结构及输运特性。湍流结构的生成演化与作用机理年度交流会流体力学研讨会, 2019.01, 海口。
18. Nusselt number enhancement and flow structures in Rotating Rayleigh-Bénard convection. *71th Annual Meeting of the APS DFD*. November 2018, Atlanta, USA.
19. 旋转壁湍流流动结构。中国科协 2018 青年科学家论坛-湍流结构的生成与时空演化, 2018.10, 长沙。
20. fingering double diffusive convection and oceanic thermohaline staircases. *PoF 20 - Alumni meeting*. October 2018, Enschede, The Netherlands.
21. 海洋温盐驱动对流湍流中的流动结构。“湍流结构的生成演化及作用机理”中青年研讨会, 2018.07, 天津。
22. Fingering double diffusive convection. *International Conference on Rayleigh-Bénard Turbulence*. May 2018, Enschede, The Netherlands. Keynote Speaker.
23. Double diffusive convection in the fingering regime. 全国力学大会, 2017.08, 北京。

邀请报告

1. 湍流热对流若干研究进展。北京科技大学纪念建校 70 周年系列学术活动报告。2022.04
2. 双扩散湍流研究新进展。中国科学院力学研究所。2021.12
3. 双扩散湍流中的分层与多态现象。福建师范大学数学与统计学院。2021.11
4. 海洋温盐驱动双扩散湍流。北京大学大气与海洋科学系。2020.12 Department of Atmospheric and Oceanic Science, Peking University. December 2020, Beijing, China.
5. 双扩散湍流中的分层与多态现象。北京应用物理与计算数学研究所。2020.11
6. 海洋双扩散对流湍流。南方科技大学力学与工程科学系。2020.10
7. 海洋双扩散湍流。北京科技大学理学院。2020.09
8. Double diffusive convection and thermohaline staircases. 西北工业大学极端力学研究院。2020.01

9. Double diffusive convection and thermohaline staircases. 浙江大学流体工程所。2019.11
10. Double diffusive convection and thermohaline staircases. Center for Fluid Mechanics, Brown University. September 2019, Providence, USA.
11. Double diffusive convection and thermohaline staircases. Center of Mathematical Sciences and Applications, Harvard University. September 2019, Boston, USA.
12. 海洋盐指型双扩散对流数值模拟。复旦大学航空航天系。2019.08
13. 盐指型双扩散湍流。浙江大学流体工程所。2018.09
14. 双扩散湍流。中国科技大学近代力学系。2018.06
15. 带标量场流动数值模拟：从宏观湍流到微观流动。天津大学 MBIOS 实验室。2018.06
16. 双扩散湍流。南方科技大学力学与工程科学系。2018.06
17. 双扩散湍流。北京应用物理与计算数学研究所。2018.03

指导学生

- 博士后：邹舒帆 (2019.09–2021.09)，现为国防科技大学教职人员。
- 博士研究生：Anas Bin Aqeel (博士, 2017-2020, 与段慧玲教授、吕鹏宇博士共同指导), Muhammad Mohasan (博士, 2017-2021, 与段慧玲教授、吕鹏宇博士共同指导), 李俊毅 (2018 至今), 杜宇航 (2018 至今), 陈文渊 (2019 至今), 胡成龙 (2020 至今), 刘晓超 (2020 至今), 郭容夫 (2021 至今), 吕凯 (2021 至今), 张益宁 (2022 至今)
- 硕士研究生：陈洋 (硕士, 2017-2020, 与蔡庆东教授共同指导), 黄文娟 (硕士, 2017-2021, 与蔡庆东教授共同指导)
- 本科生：李俊毅 (2018), 邱旭汶 (2019-2021), 陈文渊 (2019), 胡成龙 (2020), 郭容夫 (2020-2021), 张秦 (2020), 张仲毅 (2020), 林麟 (2021), 宋子卓 (2021), 黄松 (2021, 与吴建国教授联合指导), 张益宁 (2022), 褚永铭 (2022), 李伟韬 (2022), 陈旭 (2022), 杨超博 (2022 至今)

社会服务

- 青年编委,《气体物理》, 2021 至今
- 中国力学学会对外交流与合作委员会委员, 2020 至今
- 北京大学纪念周培源诞辰 120 周年系列活动之流体力学学术研讨会和力学青年学术研讨会, 组委会成员。2022
- The International Symposium on Turbulence in Memory of Chou Pei-Yuan's 120th Anniversary of Birth, 组委会成员。2022
- The 9th International Conference on Rayleigh-Bénard Turbulence, 组委会成员。(因疫情推迟)。
- 第一期流体力学青年学术沙龙, 组织者。2021
- 北京大学全国力学博士生论坛, 组委会成员。2019, 2020
- 中国力学学会青年学术沙龙第 96 次活动, 组委会成员。2017
- 北京大学工学院本科理论与应用力学专业班主任, 2017-2021

- 期刊审稿人: *Journal of Fluid Mechanics, Physical Review Letters, Physical Review Fluids, Physical Review E, Geophysical Review Letters, Journal of Physical Oceanography, International Journal of Heat and Mass Transfer, Journal of Turbulence, European Journal of Mechanics - B/Fluids, International Journal of Multiphase Flow, Physics of Fluids, Journal of Hydrodynamics, Acta Mechanica Sinica, Acta Aerodynamica Sinica, Chinese Journal of Aeronautics, Applied Mathematics and Mechanics (English Edition), Advances in Applied Mathematics and Mechanics, Chinese Journal of Physics, Theoretical and Applied Mechanics Letters, Chinese Physics B, Advances in Mechanics, National Science Review, The Aeronautical Journal*

荣誉奖励

- 北京大学教学优秀奖, 2022。
- 北京大学教学成果一等奖, 2021, 团队成员, 排名 6/6。
- 北京大学-京东方奖教金, 2021。
- 北京大学第二十届青年教师教学基本功比赛, 二等奖, 2020。
- Winner of the Visualization Challenge at Super D Event of SURFsara, The Netherlands. 2016.