

# CURRICULUM VITAE

## Professor Tong Yang

### Personal Particulars

Name: Tong Yang

Citizenship: Hong Kong Special Administrative Region (HKSAR), China

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### Education

PhD in Mathematics, University of California, Davis, USA	June 1993
MSc in Zhongshan University	July 1990
BSc in Zhongshan University	July 1987

### Professional Career

• Chair Professor of Mathematics, City University of Hong Kong	09/2007 - present
• Professor, City University of Hong Kong	07/2002 - 08/2007
• Associate Professor, City University of Hong Kong	06/1999 - 06/2002
• Assistant Professor/Lecturer, City University of Hong Kong	09/1994 - 06/1999
• Postdoctoral Member, Institute for Advanced Study, Princeton, USA	09/1993 - 08/1994

### Distinctions and Academic Awards

- Fellow of The World Academy of Sciences, 2021.
- Fellow of American Mathematical Society, 2021.
- The Hong Kong Research Grants Council-Senior Research Fellow, 2020.
- Ministry of Education Higher Education Outstanding Scientific Research Output Award (Science and Technology), China (First Prize), 2019.
- Fellow of the European Academy of Sciences, 2018.
- The President's Award, City University of Hong Kong, 2015 and 2016.
- State Natural Science Award (2nd class), P.R. China, 2012.
- Croucher Senior Research Fellowship, 2011.
- Grant Award of Research Excellence Awards, City University of Hong Kong, 2009.
- Changjiang Chair Professorship, the Ministry of Education of China, 2005.
- Joint Research Fund for Hong Kong and Macau Young Scholars, National Science Fund for Distinguished Young Scholars, 2004.

- Morningside Silver Medal of Mathematics, ICCM, 1998.

## Current Research Areas

1. **Conservation laws:** Well-posedness theory and solution behavior, singularity analysis.
2. **Boltzmann equation:** Well-posedness theory and solution behavior, fluid dynamic limits, boundary layer theory, regularity estimates.
3. **Boundary layer theories:** Well-posedness theory and high Reynolds number limits.

## Honors and Professional Positions

- Member at large, Hong Kong Mathematical Society (since June-2020)
- The President of the Hong Kong Mathematical Society (May 2016-May 2020)
- Honorary Professor of Guangxi University (2019-2024)
- Visiting Chair Professor of Shanghai Jiao Tong University, China (since 10/2013)
- Visiting Chair Professor of Jinan University, China (2015-2018)
- Officer of Mathematics Division, European Academy of Sciences (2019-2022)
- Panel Member of the Physical Science Panel of Research Grants Council (RGC), HKSAR (7/2010- 6/2015; 11/2019-10/2022)
- Scientific Committee Member of the Hong Kong Scholar Scheme (since 2011)
- Scientific Committee of MOE Key Lab on Scientific and Engineering Computing, Shanghai Jiao Tong University (2018-2021)

## Editorial Work

### Co-Editor-in-Chief

- Kinetic and Related Model, (2008-)
- Analysis and Applications, (2013-2017)

### Editorial Board

- SIAM Journal on Mathematical Analysis, (2021-)
- London Mathematical Society: Bulletin, Journal and Transactions, (2020-)
- Journal of Mathematical Analysis and Applications, (2017-)

## Administration Posts

- Head of Department of Mathematics 08/2012 – 08/2018
- Associate Dean of College of Science and Engineering 09/2007 – 08/2011

## Published / Accepted Journal Papers

1. Jingwei Hu, Kunlun Qi and **Tong Yang**, A new stability and convergence proof of the Fourier-Galerkin spectral method for the spatially homogeneous Boltzmann equation, to appear in SIAM Journal on Numerical Analysis.
2. Chengjie Liu, Yaguang Wang and **Tong Yang**, Study of boundary layers in compressible

non-isentropic flows, to appear in *Methods and Applications of Analysis*.

3. Hailiang. Li, **Tong Yang** and Mingying Zhong, Diffusion limit of the Vlasov-Poisson-Boltzmann system, to appear in *Kinetic and Related Models*.
4. Wei-Xi Li, Nader Masmoudi and **Tong Yang**, Well-posedness in Gevrey function space for 3D Prandtl equations without structural assumption, to appear in *Communications on Pure and Applied Mathematics*.
5. Huanyao Wen, **Tong Yang**, Xinhua Zhao and Changjiang Zhu, Optimal convergence rate of the vanishing shear viscosity limit for compressible Navier-Stokes equations with cylindrical symmetry, to appear in *Journal de Mathematique Pures et Appliquees*. DOI 10.1016/j.matpur.2020.09.003.
6. Ricardo Alonso, Yoshinori Morimoto, Weiren Sun and **Tong Yang**, Non-cutoff Boltzmann equation with polynomial decay perturbation, *Revista Matematica Iberoamericana*, 37(2021), no. 1, 189-292.
7. Chengjie Liu, Dehua Wang, Feng Xie and **Tong Yang**, Magnetic effects on the solvability of 2D MHD boundary layer equations without resistivity in Sobolev spaces, *Journal of Functional Analysis* 279 (2020) 108637.
8. Hailiang Li, **Tong Yang** and Mingying Zhong, Green's function and pointwise space-time behavior of the Vlasov-Poisson-Boltzmann equation, *Archive for Rational Mechanics and Analysis*, 235, 1011-1057(2020).
9. Wei-xi Li and **Tong Yang**, Well-posedness in Gevrey function space for the Prandtl equations with non-degenerate critical points, *Journal of European Mathematical Society*, 22, 717-775 (2020).
10. Cheng-Jie Liu, Feng Xie and **Tong Yang**, Justification of Prandtl ansatz for MHD boundary layer, *SIAM Journal on mathematical Analysis*, 51(3), (2019), 2748-2791.
11. Hongjie Dong, **Tong Yang** and Mingying Zhong, Exterior problem of the linear Vlasov-Poisson-Boltzmann system, *SIAM Journal on mathematical Analysis*, 51(3), 1792-1823 (2019).
12. Xulong Qin, **Tong Yang**, Zhengan Yao and Wenshu Zhou, Vanishing shear viscosity limit and boundary layer study for the planar MHD system, *Mathematical Models and Methods in Applied Sciences*, 1139-1174 (2019).
13. Chengjie Liu, Feng Xie and **Tong Yang**, MHD boundary layers in Sobolev spaces without monotonicity. I. Well-posedness theory, *Communications on Pure and Applied Mathematics*, vol. LXXII, 0063-0121 (2019).
14. Xie Feng and **Tong Yang**, Lifespan of solutions to MHD boundary layer equations with analytic perturbation of general shear flow, *Acta Mathematicae Applicatae Sinica*, vol. 35, no. 1 (2019), 209-229.

15. Xie Feng and **Tong Yang**, Global-in-time stability of 2D MHD boundary layer in the Prandtl-Hartmann Regime, *SIAM Journal on Mathematical Analysis*, 50(6), 5749-5760(2018).
16. Yongting Huang, Chengjie Liu and **Tong Yang**, Local-in-time well-posedness for compressible MHD boundary layer, *Journal of Differential Equations*, 266(6), 2978-3013 (2019).
17. **Tong Yang** and Hongjun Yu, Global solution for the spatially inhomogeneous non-cutoff Kac equation, *SIAM Journal on Mathematical Analysis*, vol. 50, no. 4, 4503-4562 (2018).
18. Chengjie Liu, Feng Xie and **Tong Yang**, A note on the ill-posedness of shear flow for the MHD boundary layer equations, *Science China Mathematics*, 61(11), 2065-2078 (2018).
19. Hailiang Li, Yi Wang, **Tong Yang** and Mingying Zhong, Stability of nonlinear wave patterns to the bipolar Vlasov-Poisson-Boltzmann system, *Archive for Rational Mechanics and Analysis*, Vol. 228, no. 1, 39-127 (2018).
20. Yoshinori Morimoto, Shuaikun Wang and **Tong Yang**, Moment classification of infinite energy solutions to the homogeneous Boltzmann equation, *Analysis and Applications*, vol. 15, no. 3, 391–411 (2017).
21. Renjun Duan, Feimin Huang, Yong Wang and **Tong Yang**, Global Well-posedness of the Boltzmann equation with large amplitude initial data, *Archive for Rational Mechanics and Analysis*, vol. 225, no. 1, 375–424 (2017).
22. Renjun Duan, Yuanjie Lei, **Tong Yang** and Huijiang Zhao, The Vlasov-Maxwell-Boltzmann system near Maxwellians in the whole space with very soft potentials, *Communications in Mathematical Physics*, vol. 351, no. 1, 95–153 (2017).
23. Chengjie Liu, Yaguang Wang and **Tong Yang**, A well-posedness theory for the Prandtl equations in three space variables, *Advances in Mathematics*. vol. 308, 1074–1126, (2017).
24. Yoshinori Morimoto, **Tong Yang** and Huijiang Zhao, Convergence to self-similar solutions for the Homogeneous Boltzmann Equation, *Journal of European Mathematical Society*, 19, no. 8, 2041-2067 (2017).
25. Chengjie Liu and **Tong Yang**, Ill-posedness of the Prandtl equations in Sobolev spaces around a shear flow with general decay, *Journal de Mathematique Pures et Appliquees*, 108 (2017), 150-162.
26. Yoshinori Morimoto, Shuaikun Wang and **Tong Yang**, Measure valued solutions to the spatially homogeneous Boltzmann equation without angular cutoff, *Journal of Statistical Physics*, vol.165, no. 5, 866–906 (2016).
27. Chengjie Liu, Yaguang Wang and **Tong Yang**, Global existence of weak solutions to the three-dimensional Prandtl equations with a special structure, *Discrete and*

28. Chunhua Jin and **Tong Yang**, Time periodic solution to the compressible Navier-Stokes equations in a periodic domain, *Acta Mathematica Scientia*, vol. 36, no. 4, 1015–1029, (2016).
29. Yong-Kum Cho, Yoshinori Morimoto, Shuaikun Wang and **Tong Yang**, Probability measures with finite moments and the homogeneous Boltzmann equation, *SIAM Journal on Mathematical Analysis*, vol. 48, no. 4, 2399-2413 (2016).
30. Feimin Huang, Yi Wang, Yong Wang and **Tong Yang**, Justification of limit for the Boltzmann equation related to Korteweg theory, *Quarterly of Applied Mathematics*, vol. 74, no. 4, 719-764 (2016).
31. **Tong Yang** and Hongjun Yu, Spectrum analysis of some kinetic equations, *Archive for Rational Mechanics and Analysis*, vol.222, no.2, 731-768 (2016).
32. Cheng-Jie Liu, Ya-Guang Wang and **Tong Yang**, On the ill-posedness of the Prandtl equations in three-dimensional space, *Archive for Rational Mechanics and Analysis*, Vol. 220, Issue 1, (2016), 83-108.
33. Hai-Liang Li, **Tong Yang**, Mingying Zhong, Spectrum analysis and optimal decay rates of the bipolar Vlasov-Poisson-Boltzmann equations, *Indiana University Mathematics Journal*, Vol. 65, Issue 2, (2016), 665-725.
34. Hai-Liang Liu, **Tong Yang** and Mingying Zhong, Spectrum structure and behaviors of the Vlasov-Maxwell-Boltzmann systems, *SIAM Journal on Mathematical Analysis*, Vol. 48, Issue 1, (2016), 595-669.
35. Yoshinori Morimoto and **Tong Yang**, Local existence of polynomial decay solutions to the Boltzmann equation for the soft potentials, *Analysis and Applications*, Vol. 13, Issue 6, (2015), 663-683.
36. Chunhua Jin and **Tong Yang**, Time periodic solutions to 3D compressible Navier-Stokes system with external force in  $\mathbb{R}^3$ , *Journal of Differential Equations*, Vol. 259, Issue 7, (2015), 2576-2601.
37. Xulong Qin, **Tong Yang**, Zhengan Yao and Wenshu Zhou, A study on the boundary layer for the planar magnetohydrodynamics system, *Acta Mathematica Scientia*, Vol. 35, Issue 4, (2015), 787-806.
38. Yaguang Wang, Feng Xie and **Tong Yang**, Local well-posedness of Prandtl equations for compressible flow in two space variables, *SIAM Journal of Mathematical Analysis*, 47(1), (2015), 321-346.
39. Xulong Qin, **Tong Yang**, Zheng-an Yao and Wenshu Zhou, Vanishing shear viscosity and boundary layer for the Navier-Stokes equations with cylindrical symmetry, *Archive for Rational Mechanics and Analysis*, 216 (2015), 1049-1086.
40. Feimin Huang, Yi Wang, Yong Wang and **Tong Yang**, Vanishing viscosity of isentropic

- Navier-Stokes equations for interacting shocks, *Science China Mathematics*, Vol. 58, no. 4, 653-672, (2015).
41. Yoshinori Morimoto, Shuaikun Wang and **Tong Yang**, A New characterization and global regularity of infinite energy solutions to the homogeneous Boltzmann equation, *Journal de Mathematique Pures et Appliquees*, 9(103)(3), (2015), 809-829.
  42. Radjesvarane Alexandre, Yaguang Wang, Chao-Jiang Xu and **Tong Yang**, Well-posedness of The Prandtl Equation in Sobolev Spaces, *Journal of American Mathematical Society*, 28(3), (2015), 745-784.
  43. Yoshinori Morimoto and **Tong Yang**, Smoothing effect of the homogeneous Boltzmann equation with measure valued initial datum, *Ann. Inst. H. Poincaré Anal Non Linéaire*, 32 (2015), 429-442.
  44. Shuangqian Liu, **Tong Yang** and Huijiang Zhao, Compressible Navier-Stokes Approximation to the Boltzmann Equation, *Journal of Differential Equations*, Vol 256 (2014), 3770-3816.
  45. Hongxia Liu, **Tong Yang**, Huijiang Zhao and Qingyang Zou, One-dimensional Compressible Navier-Stokes Equations with Temperature Dependent Transport Coefficients and Large Data, *SIAM Journal on Mathematical Analysis.*, 46(3), (2014), 2185-2228.
  46. Feimin Huang, Yi Wang, Yong Wang and **Tong Yang**, The Limit of the Boltzmann Equation to the Euler Equations for Riemann Problems, *SIAM Journal on Mathematical Analysis*, 45(3), (2013), 1741-1811.
  47. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chaojiang Xu and **Tong Yang**, Local existence with mild regularity for the Boltzmann equation, *Kinetic and Related Models*, vol. 6, no. 4 (2013), 1011-1041.
  48. Zhong Tan, **Tong Yang**, Huijiang Zhao and Qingyang Zou, Global Solutions to the One-dimensional Compressible Navier-Stokes-Poisson Equations with Large Data, *SIAM Journal on Mathematical Analysis*, vol. 45, no. 2 (2013), 547-571.
  49. Renjun Duan, **Tong Yang** and Huijiang Zhao, The Vlasov-Poisson-Boltzmann System for Soft Potentials, *Mathematical Models and Methods in Applied Sciences*, vol. 23, no. 6 (2013), 979-1028.
  50. Renjun Duan, Shuangqian Liu, **Tong Yang** and Huijiang Zhao, Stability of the nonrelativistic Vlasov-Maxwell-Boltzmann system for angular non-cutoff potentials, *Kinetic and Related Models*, vol. 6, no. 1, 159-204, (2013).
  51. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Smoothing Effect of weak solutions for spatially homogeneous Boltzmann Equation without angular cutoff, *Kyoto Journal of Mathematics*, 52 (2012), no.3, 433-463.
  52. Alberto Bressan, Feimin Huang, Yi Wang and **Tong Yang**, On the convergence rate of

- vanishing viscosity approximations for nonlinear hyperbolic systems, *SIAM Journal on Mathematical Analysis*, vol. 44, no. 5, 3537-3563, (2012).
53. Zhouping Xin, **Tong Yang** and Hongjun Yu, The Boltzmann Equation with soft potentials near the Local Maxwellian, *Archive for Rational Mechanics and Analysis*, 206 (2012), no. 1, 239-296.
  54. Renjun Duan, **Tong Yang** and Huijiang Zhao, The Vlasov-Poisson-Boltzmann System in the Whole Space: The Hard Potential Case, *Journal of Differential Equations* 252 (2012), no. 12, 6356-6386.
  55. Chunhua Jin, Jingxue Yin and **Tong Yang**, Waiting time for a non-Newtonian polytropic filtration equation with convection, *Journal of Differential Equations* 252 (2012), no. 9, 4862-4885.
  56. Feimin Huang, Ming Mei, Yong Wang and **Tong Yang**, Long-Time Behavior of Solutions to the Bipolar Hydrodynamic Model of Semiconductors with Boundary Effect, *SIAM Journal of Mathematical Analysis*, vol. 44, no. 2, 1134-1164, (2012).
  57. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Boltzmann equation without angular cutoff in the whole space: I, Global existence for soft potential, *Journal of Functional Analysis*, 262 (2012), 915-1010.
  58. Feimin Huang, Yi Wang and **Tong Yang**, Vanishing Viscosity Limit of the Compressible Navier-Stokes Equations for Solutions to Riemann Problem, *Archive for Rational Mechanics and Analysis*, 203 (2012), no. 2, 379-413.
  59. **Tong Yang** and Hongjun Yu, Global solutions to the relativistic Landau-Maxwell system in the whole space, *Journal de Mathematique Pures et Appliquees*, (9)97 (2012), no. 6, 602-634.
  60. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Uniqueness of solutions for the non-cutoff Boltzmann Equation with soft potential, *Kinetic and Related Models*, Vol. 4, No. 4, (2011), 919-934.
  61. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, The Boltzmann equation without angular cutoff in the whole space: Qualitative properties of solutions, *Archive for Rational Mechanics and Analysis*, 202 (2011) 599-661.
  62. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Global existence and full regularity of the Boltzmann equation without angular cutoff, *Communications in Mathematical Physics*, 304, 513-581 (2011).
  63. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Bounded Solutions of the Boltzmann Equation in the Whole Space, *Kinetic and Related Models*, Vol. 4, no. 1 (2011), 17-40.
  64. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, The Boltzmann equation without angular cutoff in the whole space: III, Global

- existence for hard potential, *Analysis and Applications*, Vol. 9, No. 2 (2011), 113-134.
65. **Tong Yang** and Hongjun Yu, Optimal convergence rates of classical solutions for Vlasov-poisson-Boltzmann System, *Communications in Mathematical Physics*, 301, 319-355 (2011).
  66. Feimin Huang, Yi Wang and **Tong Yang**, Fluid dynamic limit of the Boltzmann equation to the Riemann solutions of the Euler equations: I, Superposition of rarefaction waves and contact discontinuity, *Kinetic and Related Models*, Vol. 3, no. 4 (2010), 685-728.
  67. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Global well-posedness theory for the spatially inhomogeneous Boltzmann equation without angular cutoff, *C. R. Math. Acad. Sci. Paris*, 348 (2010), no. 15-16, 867-871.
  68. Pierre Degond and **Tong Yang**, Diffusion in a continuum model of self-propelled particles with alignment interaction, *Mathematical Models and Methods in Applied Sciences*, Vol. 20, issue: supp01 (2010), 1459-1490.
  69. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Regularizing effect and local existence for non-cutoff Boltzmann equation, *Archive for Rational Mechanics and Analysis*, Vol. 198 (2010), No. 1, 39-123.
  70. **Tong Yang** and Hongjun Yu, Global classical solutions for Vlasov-Maxwell-Fokker-Planck system, *SIAM Journal of Mathematical Analysis*, 42 (2010), no. 1, 459-488.
  71. **Tong Yang** and Hongjun Yu, Hypocoercivity of the relativistic Boltzmann and Landau equations in the whole space, *Journal of Differential Equations*, 248 (2010), no. 6, 1518-1560.
  72. Hongfang Ma, Seiji Ukai and **Tong Yang**, Time periodic solutions of compressible Navier-Stokes equations, *Journal of Differential Equations*, 248 (2010), no. 9, 2275-2293.
  73. Renjun Duan and **Tong Yang**, Stability of the one-species Vlasov-Poisson- Boltzmann system, *SIAM Journal of Mathematical Analysis*, Vol. 41, no. 6 (2010), 2353-2387.
  74. Feimin Huang, Yi Wang and **Tong Yang**, Hydrodynamic limit of the Boltzmann equation with contact discontinuities, *Communications in Mathematical Physics*, 295 (2010), 293-326.
  75. Hai-Liang Li, **Tong Yang** and Chen Zou, Time asymptotic behavior of the bipolar Navier-Stokes-Poisson system, *Acta Mathematica Scientia Ser. B Engl. Ed.* 29 (2009), no. 6, 1721-1736.
  76. Qianshun Chang and **Tong Yang**, A Lattice Boltzmann Method for Image Denoising, *IEEE Transactions on Image Processing*, vol. 18, no. 2 (2009), 2797-2802.



77. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Existence of local solutions for Boltzmann equation without angular cutoff, C. R. Math. Acad. Sci. Paris, 347 (2009), no. 21-22, 1237-1242.
78. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Regularity of solutions for Boltzmann equation without angular cutoff, C. R. Math. Acad. Sci. Paris, 347 (2009), no. 13-14, 747-752.
79. Jie Liao, Weike Wang and **Tong Yang**, Lp convergence rates of diffusion waves for multi-dimensional Euler equations with damping, Journal of Differential Equations Volume 247, issue 1 (2009), Pages 303-329.
80. Renjun Duan, Seiji Ukai and **Tong Yang**, A Combination of Energy Method and Spectral Analysis for the Study on Systems for Gas Motions, Frontiers of Mathematics in China, Vol. 4, No. 2 (2009), 253-282.
81. **Tong Yang** and Hongjun Yu, Optimal convergence rates of the Landau Equation with external force in the whole space, Acta Mathematica Scientia (2009), 29(4), 1035-1062.
82. Seiji Ukai, **Tong Yang** and Huijiang Zhao, Exterior problem of Boltzmann equation with temperature difference, Communications in Pure and Applied Analysis, Vol. 8 (2009), no. 1, 473-491.
83. Zaihong Jiang and **Tong Yang**, A new nonlinear functional for general scalar hyperbolic conservation laws, Journal of Differential Equations, 246 (2009), 4284-4308.
84. Seiji Ukai, **Tong Yang** and Huijiang Zhao, Stationary solutions to the exterior problem for the Boltzmann equation, I. Existence, Discrete and Continuous Dynamical Systems, Vol. 23 (2009), no. 1-2, 495-520.
85. Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Regularity of solutions to the spatially homogeneous Boltzmann equation without Angular cut-off, Discrete and Continuous Dynamical Systems, A special issue on Boltzmann Equations and Applications, Vol. 24 (2009), No. 1, 187-212.
86. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chao-Jiang Xu and **Tong Yang**, Uncertainty principle and kinetic equations, Journal of Functional Analysis, Vol. 255 (2008), no.8, 2013-2066.
87. Feimin Huang, Zhouping Xin and **Tong Yang**, Contact discontinuity with general perturbations for gas motions, Advances in Mathematics, Vol. 219 (2008), no.4, 1246-1297.
88. Zhaohui Huo, Yoshinori Morimoto, Seiji Ukai and **Tong Yang**, Regularity of solutions for spatially homogeneous Boltzmann equation without angular cutoff, Kinetic and Related Models, Vol. 1 (2008), no. 3, 453-489.
89. Renjun Duan, Meng-Rong Li and **Tong Yang**, Propagation of Singularities in the

Solutions to the Boltzmann Equation near Equilibrium, Mathematical Models and Methods in Applied Sciences, Vol. 18 (2008), no.7, 1093-1114.

90. Claude Bardos, C. David Levermore, Seiji Ukai and **Tong Yang**, Kinetic equations and an incompressible fluid dynamical limit that recovers viscous heating, Bulletin of the Institute of Mathematics, Academia Sinica, 3 (2008), no. 1, 1-49.
91. Renjun Duan, Seiji Ukai, **Tong Yang** and Huijiang Zhao, Optimal Decay Estimates on the Linearized Boltzmann Equation with Time Dependent Force and their Applications, Communications in Mathematical Physics, Vol. 277, No. 1 (2008), 189-236.
92. Radjesvarane Alexandre, Yoshinori Morimoto, Seiji Ukai, Chaojiang Xu and **Tong Yang**, Uncertainty Principle and Regularity for Boltzmann Type Equations, Comptes rendus Mathématique, Vol. 345, No. 12, 673-677, (2007).
93. Weike Wang and **Tong Yang**, Stability of planar diffusion waves for two dimensional Euler equations with damping, Journal of Differential Equations, 242, no. 1, 40-71, (2007).
94. Weike Wang, **Tong Yang** and Xiongfeng Yang, Existence of boundary layers to the Boltzmann equation with cutoff soft potentials, Journal of Mathematical Physics, 48 (2007), no. 7, 073304, 21pp.
95. Renjun Duan, Hongxia Liu, Seiji Ukai and **Tong Yang**, Optimal  $L_p$  - $L_q$  Convergence rates for the Navier-Stokes equations with potential force, Journal of Differential Equations, 238 (2007), no.1, 220-233.
96. Hongxia Liu and **Tong Yang**, A nonlinear functional for general scalar hyperbolic conservation laws, Journal of Differential Equations, 235 (2007), no.2, 658-667.
97. Renjun Duan, Seiji Ukai, **Tong Yang** and Huijiang Zhao, Optimal convergence rates for the compressible Navier-Stokes equations with potential forces, Mathematical Models and Methods in Applied Sciences, 17 (2007), no. 5, 737-758.
98. Renjun Duan, **Tong Yang** and Changjiang Zhu, Navier-Stokes equations with degenerate viscosity, vacuum and gravitational force, Mathematical Methods in the Applied Sciences, 30 (2007), no.3 347-374.
99. Chunpeng Wang, **Tong Yang** and Jingxue Yin, Self-similar solutions and asymptotic behavior for a class of degenerate and singular diffusion equations, Proceedings of the Royal Society of Edinburgh Proceeding A, 137A, 581-6-2, (2007).
100. Renjun Duan, **Tong Yang** and Changjiang Zhu, Existence of stationary solutions to the Vlasov-Poisson-Boltzmann system, Journal of Mathematical Analysis and Applications, 327 (2007), 425-434.
101. **Tong Yang**, Mei Zhang and Changjiang Zhu, Existence of strong travelling wave profiles to  $2 \times 2$  systems of viscous conservation laws, Proceedings of the American Mathematical Society, Vol. 135 (2007), no. 6, 1843-1849.

102. Seiji Ukai, **Tong Yang** and Huijiang Zhao, Convergence rate to stationary solutions for Boltzmann equation with external force, Chinese Annals of Mathematics, Ser. B, 27 (2006), no. 4, 363-378.
103. Seiji Ukai and **Tong Yang**, The Boltzmann equation in the space  $L^2 \cap L^\infty_p$ : Global and time-periodic solutions, Analysis and Applications, 4 (2006), no. 3, 263-310.
104. Seiji Ukai, **Tong Yang** and Huijiang Zhao, Convergence rate for the compressible Navier-Stokes equations with external force, Journal of Hyperbolic Differential Equations, 3 (2006), no. 3, 561-574.
105. Weike Wang, **Tong Yang** and Xiongfeng Yang, Nonlinear stability of boundary layers of the Boltzmann equation for cutoff hard potentials, Journal of Mathematical Physics, 47 (2006), 083301.
106. Yinbin Deng and **Tong Yang**, Multiplity of stationary solutions to the Euler-Poisson equations, Journal of Differential Equations, 231 (2006), 252-289.
107. **Tong Yang** and Huijiang Zhao, Global existence of classical solutions to the Vlasov-Poisson-Boltzmann system, Communications in Mathematical Physics, 268, 569-605 (2006).
108. **Tong Yang** and Huijiang Zhao, A new entropy method for the Boltzmann equation, Journal of Mathematical Physics, 47, 053301 (2006).
109. Jiale Hua and **Tong Yang**, An improved convergence rate of Glimm scheme for general systems of hyperbolic conservation laws, Journal of Differential Equations, 231 (2006), 92-107.
110. Renjun Duan, **Tong Yang** and Changjiang Zhu, L1 and BV-type stability of the Boltzmann equation with external forces, Journal of Differential Equations, 227 (2006), no. 1, 1-28.
111. Feimin Huang and **Tong Yang**, Stability of contact discontinuity for the Boltzmann equation, Journal of Differential Equations, 229 (2006), 698-742.
112. **Tong Yang**, Hongjun Yu and Huijiang Zhao, Cauchy problem for the Vlasov-Poisson-Boltzmann system, Archive for Rational Mechanics and Analysis, 182, No. 3, 415-470, (2006).
113. Tai-Ping Liu, **Tong Yang**, Shih-Hsien Yu and Huijiang Zhao, Nonlinear stability of rarefaction waves for Boltzmann equation, Archive for Rational Mechanics and Analysis, 181 (2006), no. 2, 333-371.
114. Renjun Duan, **Tong Yang** and Changjiang Zhu, Boltzmann equation with external force and Vlasov-Poisson-Boltzmann system in infinite vacuum, Discrete and Continuous Dynamical Systems, 16 (2006), no. 1, 253-277.
115. **Tong Yang**, Singular behavior of vacuum states for compressible fluid, Journal of

Computational and Applied Mathematics, 190 (2006), 211-231.

116. Seiji Ukai, **Tong Yang** and Huijiang Zhao, Global solutions to the Boltzmann equation with external forces, *Analysis and Applications*, 3 (2005), no. 2, 157-193.
117. Renjun Duan, **Tong Yang** and Changjiang Zhu, Global existence to Boltzmann equation with external force in infinite vacuum, *Journal of Mathematical Physics*, 46 (2005), 053307-13.
118. **Tong Yang** and Huijiang Zhao, A half-space problem for the Boltzmann equation with specular reflection boundary condition, *Communications in Mathematical Physics*, 255 (2005), no. 3, 683-727.
119. Chao-Jiang Xu and **Tong Yang**, Local existence with physical vacuum boundary condition to Euler equations with damping, *Journal of Differential Equations*, 210 (2005), 217-231.
120. **Tong Yang** and Huijiang Zhao, Asymptotics toward strong rarefaction waves for  $2 \times 2$  systems of viscous conservation laws, *Discrete and Continuous Dynamical Systems-Series A*, 12 (2005), no. 2, 251-282.
121. Chunpeng Wang, **Tong Yang** and Jingxue Yin, A class of self-similar solutions to a singular and degenerate diffusion equation, *Nonlinear Analysis*, 60/4 (2005), 775-796.
122. Alberto Bressan and **Tong Yang**, On the convergence rate of vanishing viscosity approximations, *Communications on Pure and Applied Mathematics*, LVII (2004), 1075-1109.
123. Alberto Bressan and **Tong Yang**, A sharp decay estimate for positive nonlinear waves, *SIAM Journal of Mathematical Analysis*, 36 (2004), no. 2, 659-677.
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### Lecture Notes

Seiji Ukai and **Tong Yang**, Mathematical Theory of Boltzmann Equation, Lecture Notes Series, no. 8, Liu Bie Ju Centre for Mathematical Sciences, City University of Hong Kong, March 2006.

### Chapter in Book

Seiji Ukai and **Tong Yang**, Stationary Problems of the Boltzmann Equation, HANDBOOK OF DIFFERENTIAL EQUATIONS, Stationary Partial Differential Equations, volume 5, 371-485, Edited by M. Chipot, 2008 Elsevier B.V.

### Research Projects

#### General Research Fund (GRF) (Before called Competitive Earmarked Research Grant) (Role of Principal Investigator)

Project title	Awarded amount HK\$	Period
RGC Senior Research Fellow 2020/21	7,798,380	01/01/2021-31/12/2025
MHD boundary layer theories and beyond	899,792	01/01/2021-31/12/2024
Some Mathematical Theories for High Reynolds Number Limit	753,667	01/09/2019-31/08/2022
Instability and Critical Regularity Indices for Degenerate PDEs of Prandtl-typed Systems	684,585	01/08/2018-31/07/2021
Stability and Instability Analysis of Compressible Fluid with non-slip Boundary Condition	488,501	01/08/2016-31/07/2019
Exterior problems for the Vlasov-Maxwell System	933,362	01/09/2015 - 31/08/2018

Regularization of Measure Valued Solutions to the Boltzmann Equation and Some Related Problems	1,003,876	01/07/2014 - 30/06/2017
Mathematical Theories on the Prandtl System in Sobolev Spaces	868,303	01/01/2014 - 31/12/2016
Justification of Limits to the Compressible Euler Equations with Wave Interactions	700,000	01/11/2012 - 31/10/2015
Well-posedness Theory of Kinetic Equations in a General Setting	1,002,000	01/12/2011 - 30/11/2014
Hydrodynamic Limits of the Boltzmann Equation with Contact Discontinuities	655,700	01/08/2010 - 06/03/2014
Kinetic Theory of Boundary Layer Problems without Angular Cut-off	681,540	01/09/2009 - 16/04/2013
Interior and Exterior Problems for Kinetic Equations	293,700	01/10/2008 - 17/04/2012
Some Problems on Hypocoercivity for Kinetic Equations	445,000	01/10/2007 - 16/03/2011
Some Mathematical Theories of the 'Ghost-effect' in the Boltzmann Equation	388,460	01/08/2006 - 08/02/2010
Some Problems on the Boltzmann Equation with Force	463,600	01/09/2005 - 12/02/2008
Stability of Nonlinear Wave Patterns for Boltzmann Equation	318,000	01/09/2004 - 07/02/2007
Some Vacuum Problems to Boltzmann equation and related Fluid Dynamic Systems	324,000	01/09/2003 - 08/11/2005
Behaviour of Solutions to Boltzmann Equation with or without Cutoff	293,370	01/12/2001 - 01/09/2004
Boundary Layer of Boltzmann Equation	300,000	01/08/2002 - 19/01/2004
Vacuum States for Compressible Flow	287,817	01/12/2000 - 28/01/2003
Nonlinear Functionals for Glimm Scheme and BV Entropy Solutions	405,000	01/10/1999 - 18/10/2002
Lax-Friedrichs' Scheme and Nonlinear	425,000	01/10/1998 - 01/03/2001

#### Functionals for Conservation Laws

$L_1$ Well-posedness of Hyperbolic Conservation Laws	416,000	01/12/1997 - 30/07/1999
Existence and Non-existence of Regular Solutions and Boundary Layer Problem	474,000	01/12/1996 - 26/02/1999
Mathematical Theory of Conservation Laws	331,000	01/12/1995 - 28/02/1998

#### **Joint Research Fund for Hong Kong and Macau Young Scholars, National Science Fund for Distinguished Young Scholars, National Natural Science Foundation of China (NSFC) (Role of Principal Investigator)**

Project title	Awarded amount	Period
Partial Differential Equations	RMB400,000	01/01/2003 - 31/12/2006

#### **The National Natural Science Foundation of China (NSFC) and the Research Grants Council (RGC) of Hong Kong Joint Research Scheme (Role of Principal Investigator)**

Project title	Awarded amount HK\$	Period
Mathematical Theories of Some Kinetic and Fluid Models	730,751	01/01/2013 - 31/12/2016

#### **CityU Strategic Research Grant (SRG) / CityU Direct Allocation Grant (DAG) / CityU Small-scale Research Grant (SMA) (Role of Principal Investigator)**

Project title	Awarded amount HK\$	Period
Nonlinear Functional Approach to the Study of Systems of Hyperbolic Conservation Laws	165,377	01/04/2009 - 18/01/2010
Large Time Behavior of Solutions to Kinetic Equations with Singular Angular Kernels	172,261	01/04/2008 - 12/10/2009
Boltzmann Equation with Debye-Yukawa Potential	180,000	01/04/2007 - 16/04/2009
$L^1$ and BV Stabilities of Solutions to the Boltzmann Equation and Some Related Systems	180,000	01/04/2006 - 26/07/2007

Some Problems on the Boltzmann Equation with Boundary Effects	180,000	01/07/2005 - 23/06/2006
Convergence Rates of Vanishing Viscosity Approximations and Some Numerical Schemes	170,000	01/07/2004 - 13/01/2006
Large Rarefaction Waves for Systems of Fluid Dynamics and Boltzmann Equation	158,000	01/06/2003 - 22/09/2004
BV Estimates for Lax-Friedrichs' Scheme	236,114	01/09/2002 - 18/09/2003
Singular Behaviour of Solutions to Euler-Poisson Equations with Vacuum	100,000	01/09/2001 - 10/07/2003
Interface and Large Time Behaviour of Compressible Navier-Stokes Equations with Density-dependent Viscosity and Vacuum	265,600	01/09/2000 - 22/01/2002
Shock Layer and Boundary Layer for Systems of Conservation Laws	--	01/08/1999 - 01/03/2001
Qualitative Analysis of BV Solutions of Euler Equations with Frictional Damping	--	01/12/1997 - 03/08/1999
Existence and Stability of Solutions of Hyperbolic Systems	--	01/04/1996 - 30/03/1998
Mathematical Theory of Shock Waves	--	01/05/1995 - 16/05/1997
Conservation Laws with Spherical Symmetry	--	28/02/1995 - 29/02/1996

### Selected plenary/Invited talks in conferences since 2011

- The 4<sup>th</sup> MSJ-SI Conference: Nonlinear Dynamics in PDEs, Kyushu University, Japan, 18-21 Sept. 2011.
- Workshop on Boltzmann Models in Kinetic Theory, The Institute for Computational and Experimental Research in Mathematics, Providence Rhode Island, USA, 7-11 Nov. 2011.
- Distinguished lecture on research, Zhejiang University, Zhejiang, China, 22-25 Feb. 2012.
- 2012 International Conference on Nonlinear Analysis: Evolutionary PDE & Kinetic Theory, Academia Sinica, Taiwan, Oct. 29-Nov. 2, 2012.
- 21<sup>st</sup> Annual Workshop on Differential Equations, National Central University, Taiwan, 18-19 Jan. 2013.
- The 6<sup>th</sup> Pacific Rim Conference on Mathematics 2013, Sapporo City, Japan, 2-6 July 2013.
- 2013 International Congress of Chinese Mathematicians, National Taiwan University, Taiwan, 14-19 July 2013.
- Conference on Kinetic Modelling and Related Equations in memory of Prof. Seiji Ukai, Kyoto University, Kyoto, Japan, 27-31 Oct. 2013.
- From Mechanics to Geometry in honor of Prof. Marshall Slemrod's 70th Birthday, Seoul National University, Seoul, Korea, 25-29 May 2014.
- International Conference on Boltzmann, Vlasov and Related Equations: Last Results and Open Problems, Universidad de Cartagena, Cartagena, Columbia, 22-29 June 2014.
- ICMAT-China Exploratory Research Workshop, The Institute of Mathematical Sciences, Madrid, Spain, 17-21 Nov. 2014.
- International Conference on Mathematical Analysis on Fluid Dynamics and Conservation Laws, Tokyo Institute of Technology, Tokyo, Japan, 21-23 Jan. 2015.
- Conference on Boundary Value Problems and Multiscale Coupling Methods for Kinetic Equations, Wisconsin, United States of America, 20-26 April 2016.
- Workshop on the Boltzmann Equation, Microlocal Analysis and Related Topics at Kyoto University, Kyoto, Japan, 27-30 May 2016.
- Forefront of PDEs: modeling, analysis & numeric, Vienna University of Technology, Vienna, Austria, 12-14 Dec. 2016.
- International conference on Partial Differential Equations-Silkroad Mathematics Center series international conferences, April 1-21, 2017, Beijing, China.
- International conference on contemporary applied mathematics, May 7-11, 2018, LIASFMA, Shanghai, China.

- International forum on mathematics and history of mathematics-dedicated to the 100<sup>th</sup> birthday of Wen-Tsun Wu, May 9-10, 2019, Shanghai, China.
- XVIII international conference on hyperbolic problems: theory, numerics, applications, June 28-July 1, 2021 , Malaga, Spain.

### Doctoral students and their theses

ZHU, Changjiang	Quasilinear Hyperbolic Systems with Dissipation Effects, PhD thesis, City University of Hong Kong, Oct. 1999.
VONG, Seak Weng	Two Problems on the Navier-Stokes Equations and the Boltzmann Equation, PhD thesis, City University of Hong Kong, July 2005.
DUAN, Renjun	Some Mathematical Theories on the Gas Motion under the Influence of External Forcing, PhD thesis, City University of Hong Kong, Oct. 2008.
HUA, Jiale	Glimm Type Functional and One Dimensional Systems of Hyperbolic Conservation Laws, PhD thesis, City University of Hong Kong, July 2009.
LI, Li	The Asymptotic Behavior for the Vlasov-Poisson-Boltzmann System & Heliostat with Spinning-elevation Tracking Mode, PhD thesis, City University of Hong Kong, July 2009.
CHEN, Jing	Some Problems on Planar Rarefaction Waves for Hyperbolic Conservation Laws, PhD thesis, City University of Hong Kong, Oct. 2009.
ZHANG, Mei	Some Problems on Conservation Laws and Vlasov-Poisson-Boltzmann Equation, PhD thesis, City University of Hong Kong, Oct. 2009.
LIN, Shiyu	Some Research about the Regularity of the Solutions for Spatially Homogeneous Boltzmann Equation without Angular Cutoff, PhD thesis, City University of Hong Kong, July 2010.
TIAN, Qianzhu	Some Mathematical Theories on the Boundary Layer Problem for the Boltzmann Equation with Mixed Boundary Conditions, PhD thesis, City University of Hong Kong, July 2010.
JIANG, Zaihong	Some Mathematical Studies on General Systems of Hyperbolic Conservation Laws, PhD thesis, City University of Hong Kong, Oct. 2010.
MA, Hongfang	Solutions Behavior of Some Dissipative Systems, PhD thesis, City University of Hong Kong, Oct. 2010.
SUN, Jie	Some Mathematical Theories on the Cauchy Problem and Boundary Layer Problem for the Boltzmann Equation, PhD thesis, City University of Hong Kong, July 2011.
WANG, Lusheng	Stability of the Stationary Solution to Vlasov-Poisson-Boltzmann System with Hard Potential, PhD thesis, City University of Hong Kong, Feb. 2012.

WANG, Ying	Some Existence and Stability Problems of the Boltzmann Equations, PhD thesis, City University of Hong Kong, July 2012.
CHENG, Chi Honn	Some Mathematical Theories on the Vlasov-Maxwell-Boltzmann System, PhD thesis, City University of Hong Kong, Oct. 2012.
JIA, Xuanji	Some Mathematical Studies on the 3D Incompressible MHD System and the Boltzmann Equation, Sept. 2016.
Huang, Yongting	Some Mathematical Theories of Kinetic Related Models.
Tang, Hao	Some Research on Stochastic Transport Type Equations and Distribution Dependent Backward Stochastic Differential Equations.