**Yonghua Yan, Ph.D.**

Associate Professor

Biography:

State University

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**EDUCATION**

05/2012. Department of Mathematics, The University of Texas at Arlington, Ph.D.

03/2008. Shanghai Institute of Applied Mathematics and Mechanics, Shanghai University, M.E. 07/2005. Department of Mechanics, Shanghai University, B.S.

**WO RK EXPERI ENCE**

***Associate Professor*** *–* Department of Mathematics and Statistical Sciences, Jackson State University (2023 – present) ***Assistant Professor*** *–* Department of Mathematics and Statistical Sciences, Jackson State University (2017 – 2023) ***Assistant Professor*** – Department of Mathematics and Computer Science, Alcorn State University (2016 –2017) ***Assistant Professor*** – Department of Mathematics, Huston-Tillotson University (2014 –2016) ***Postdoctoral Research Associate*** – Department of Mathematics, University of Texas at Arlington (2012 –2014)

**RESEARCH INTERESTS**

Numerical Simulation/Computational Fluid Dynamics

Machine Learning and Data Visualization

Numerical Methods for PDEs

Turbulence, High-speed Complex Flow and Flow Control

**TEA CHING EXPERI ENCE**

Teach various BS, MS, and PhD level courses, including Calculus, Real Analysis, PDE, Numerical Methods for  PDEs, Numerical Analysis, Scientific Computing, Data Analysis and Visualization, Machine Learning Algorithm and other  math and data science related courses.

**RESEARCH EXPERIENCE**

**2016-present** Machine learning in scientific computing, Numerical study of high-speed flow control, Numerical simulation of human swallowing,

**2008-2016** High-order and High-resolution numerical methods for PDEs, Numerical simulation of supersonic flows,  Study on the mechanism of turbulence

**2005-2008** Numerical study of multiphase flow

**2004-2005** Theoretical and numerical study on the mechanism of nano carbon tubes

**PROFESSIO NAL ASSO CIATION**

Member of SIAM (Society for Industrial and Applied Mathematics).

Member of MAS (Mississippi Academy of Sciences), Vice Chair of the Math and Computer Science Division.

**RESEARCH PUBLICATIONS**

1. Enhancing Accuracy in Numerical Simulations for High-speed flows: Integrating High-order Corrections with Weighted Essentially Non Oscillatory Flux. Processes, 2024, 12, 642. https://doi.org/10.3390/pr12040642. With Yong Yang, Shiming Yuan and Caixia Chen. 2. Numerical Study of the Effect of Micro Vortices on Chaotic Flutter. Journal of Computational and Applied Mathematics. 2024, Vol 436, 115401.  with Seshendra Palakurthy, Anup Zope, Eric Collins and Shanti Bhushan.

3. Numerical Study on the Ring-like Vortex Structure Generated by MVG in High-Speed flows with Different Mach Numbers, Japan Journal of  Industrial and Applied Mathematics, Vol 39, pages3–18 (2022). With Yong Yang, Caixia Chen, Herious A. Cotton and Aliztel Serrano. 4. Modal Analysis on MVG Controlled Supersonic Flow at Different Mach Numbers. Processes 2022, 10, 1456. with Yong Yang, Caixia Chen,  Qingquan Wu, Tor A. Kwembe and Ryan Wu.

5. Study on the Sensitivity of the Streamwise Location of MVG on SWBLI in MVG-Based Supersonic Flow Control. Fluids 2022, 7, 285.  https://doi.org/10.3390/ fluids7090285. with Demetric L. Baines, Yong Yang, Caixia Chen, and Tor A Kwembe.

6. Dispersion of Daily Physical Activity Behaviors in School-Age Children: A Novel Approach to Measure Patterns of Physical Activity, Journal for  Specialists in Pediatric Nursing, 2022 Apr;27(2): e12364. with Melissa Klamm, Angela A. Duck, Michael A. Welsch. et al. 7. Liutex and Proper Orthogonal Decomposition for Coherence Structure in the Wake of Micro Vortex Generator. Book Chapter of Liutex and Third  Generation of Vortex Definition and Identification for Turbulence Research, Springer Natural, ISBN 978-3-030-70216-8. With Xuan My  Trieu and Chaoqun Liu.

8. Effect of Micro-Vortex Generator on Panel Flutter in Shock Wave-Boundary Layer Interaction. AIAA AVIATION 2022 Forum, June 27-July 1,  2022, Chicago, IL. With Seshendra Palakurthy, Anup Zope, Eric M. Collins and Shanti Bhushan.

9. Analysis of Passive Panel Flutter Control using Micro-Ramp. AIAA SCITECH 2022 Forum, January 3-7, 2022, San Diego, CA. with Seshendra  Palakurthy, Anup Zope, Eric M. Collins and Shanti Bhushan.

10. Correlation analysis between SBLI and Liutex. AIAA SCITECH 2022 Forum, January 3-7, 2022, San Diego, CA. with Vishwa Patel , Demetric  L. Blaine and Chaoqun Liu.

11. Correlation analysis between low frequency shock oscillation and Liutex in SBLI. Book Chapter of Liutex and Third Generation of Vortex  Definition and Identification for Turbulence Research, Springer Natural, ISBN 978-3-030-70216-8. With Vishwa Patel, Xiangrui Dong,  Chaoqun Liu.

12. Study on the Formation and Evolution of Asymmetrical Vortex Structures in the Late Transitional Boundary Layer. Book Chapter of Liutex and  Third Generation of Vortex Definition and Identification for Turbulence Research, Springer Natural, ISBN 978-3-030-70216-8. With Yong  Yang, Caixia Chen and Ningning Wang.

13. Long-Term Agronomic Practices in Reducing Nitrogen and Phosphorus Loss from Intensive Croplands. ACS Earth Space Chem. 2022, 6, 6, 1627–1639. With Zhongwen Ma, Mei Luo, Qiang Wang, Chen Li, Long Guo, Sheng Wu, Joseph Kazery, Limei Zhai, Hongbin Liu,  Youhua Ma, and Fengxiang X. Han.

14. Preparation and properties of visible light responsive RGO/In2TiO5 nanobelts for photocatalytic degradation of organic pollutants. Applied  Surface Science 485, pp 547–553, 2019. with Qinku Zhang, Fengxiang Han, Qilin Dai, Georgio Proctor, Pohlee Cheah, Pramanik Avijit,  Ray Paresh Chandra, Ning Kang, Mengge Hu, Binghua Yao.

15. Enhanced visible-light photocatalytic activity of one dimensional In2O3/In2TiO5 nanobelts. Materials Research Bulletin. Vol 113, pp 102-108,  2019, with Qinku Zhang, Jianhua Zhou, Qilin Dai, Binghua Yao, Chuck Chuan Ng, Fengxiang Han, Meng Ma, Pohlee Cheah, Georgio,  Proctor and Mengge Hu.

16. Agronomic Management and Rice Varieties Controlling Cd Bioaccumulation in Rice. Int. J. Environ. Res. Public Health 2019, 16, 2376;  doi:10.3390/ijerph16132376. With Liangmei Chen, Wenge Wu, Fengxiang Han, Jiangxia Li, Wenling Ye, Huanhuan Fu, Youhua Ma, and  Qiang Wang.

17. Spectrum study on unsteadiness of shock wave–vortex ring interaction. PHYSICS OF FLUIDS,Vol 30, 056101, 2018, with Xiangrui Dong, Yong  Yang,Gang Dong,and Chaoqun Liu.

18. DNS on the Evolution of Vortices in the Upper Boundary layer in Transition. Engineering Technology Open Access Journal. Vol 2(2), 555582,  2018, with Caixia Chen and Fan Yang.

19. Investigation of Shock-Boundary Layer Interaction in a Ramp Flow with MVG Under Different Turbulent Inflows. Acad J Eng Sci. 1(2),000506,  2018, with Caixia Chen, Fan Yang and Herious A Cotton.

20. Lattice Boltzmann simulation of the spreading behavior of a droplet impacting on inclined solid wall. Journal of Mechanical Science and  Technology, Vol 32(6),pp 2637-2649, 2018, with Wanyu Chen, Fan Yang, Xueyan Guo, Ren Dai and Xiaoshu Cai.  21. Frequency Investigation on Unsteadiness of Shock-Vortex Ring Interaction", 2018 AIAA Aerospace Sciences Meeting, AIAA paper 2018-0034,  with Xiangrui Dong, Yong Yang, and Chaoqun Liu.

22. LES Study on Structure Characteristics of Shock/Vortex Ring Interaction", AIAA paper 2018-1530, with Xiangrui Dong, Yinlin Dong, Yong  Yang, and Chaoqun Liu.

23. Simulation of natural convection in an inclined polar cavity using a finite-difference lattice Boltzmann method. Journal of Mechanical Science  and Technology, Vol 31(6),pp 3053-3065, 2017, with Fan Yang, Haicheng Yang, Xueyan Guo, Ren Dai and Chaoqun Liu.  24. Investigation on Spreading Behavior of a Droplet Impinging on the Solid Surface using Lattice Boltzmann, The Chinese Congress of Theoretical  and Applied Mechanics(CCTAM 2017), Beijing China, Aug 13-16, 2017. with Fan Yang, Haicheng Yang, Xueyan Guo, Ren Dai and  Chaoqun Liu

25. ILES for mechanism of ramp-type MVG reducing shock induced flow separation. Sci. China-Phys. Mech Astron.59:124711, 2016, with Yong  Yang and Chaoqun Liu.

26. Numerical Study on Microramp Vortex Generation for Supersonic Ramp Flow Control at Mach 2.5. Shock Waves, Vol 27(1), 2016, with Lin  Chen, Qin Li, Chaoqun Liu.

27. DNS Study on the Formation of Lambda Rotational Core and the Role of TS Wave in Boundary Layer Transition. Journal of Turbulence, Vol.  17(6) 572-601 (2016), with Jie Tang, Chaoqun Liu, Fan Yang.

28. Physics of multiple level hairpin vortex structures in turbulence. Sci. China-Phys. Mech Astron. Vol. 59 (2) 624703-1-11 (2016) , with YiQian  Wang, Hassan Al-Dujaly, Ning Zhao, and ChaoQun Liu.

29. Separation Topology of Microramp Vortex Generator Controlled Flow at Mach Number 2.5, Journal of Aircraft, Vol. 52(6), pp. 2095-2100,  (2015), with Qin Li, Chaoqun Liu, and Frank Lu.

30. DNS Study on Mechanism of Flow Chaos in Late Boundary Layer Transition. CMSIM Journal,.Vol( 2), pp 157-168, 2015, with Yong Yang, Jie  Tang and Chaoqun Liu.

31. DNS Study on the Evolution of Vortical Packets and Their Interactions in Boundary Layer. AIAA paper, 2015-1971, with Yiqian Wang and  Chaoqun Liu.

32. LES Study on Mechanism of Reduction of Shock Induced Flow Separation by MVG. AIAA paper, 2015-1240, with Yong Yang and Chaoqun  Liu.

33. Optimization of MVG Position for Control of Shock Boundary Layer Interaction. AIAA paper 2015-1487, with Yong Yang and Chaoqun Liu.  34. DNS Study on Role of Linearly Unstable Modes in Flow Transition. AIAA paper, 2015-0585, with Jie Tang, Yong Yang, and Chaoqun Liu.  35. Study on the Ring-like Vortical Structure in MVG Controlled Supersonic Ramp Flow with Different Inflow Conditions. Aerospace Science and  Technology, Vol 35, 2014, pp 106-115, with Chaoqun Liu.

36. DNS Study on λ-Vortex and Vortex Ring Formation in Flow Transition at Mach Number 0.5. Journal of Turbulence, Vol 15(1), 2014, pp 1-21,  with Caixia Chen, Huankun Fu and Chaoqun Liu.

37. LES and Analyses on the Vortex Structure behind Supersonic MVG with Turbulent Inflow. Appl. Math. Modell, Vol 38(1),2014, pp 196-211,  with Xiao Wang and Chaoqun Liu.

38. The vortical Structures in the Rear Separation and Wake Produced by a Supersonic Micro-Ramp. Flow Turbulence Combust, Vol 93, 2014, pp  25-36, with Xiao Wang, Zhengzhong Sun and Chaoqun Liu,

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40. Modified Weighted Compact Scheme with Global Weights for Shock Capturing. Computers and Fluids, Vol 96(13), 2014,pp 165-176, with  Huankun Fu, Zhengjie Wang and Chaoqun Liu.

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44. DNS Study of Turbulence Structure in a Boundary layer. AIAA paper, 2014-0946, with Chaoqun Liu.

45. Study on the Initial Evolution of Ring-like Vortices Generated by MVG. CEAS Aeronautical Journal, Vol 4, 2013, pp 433-443, with Chaoqun  Liu.

46. Study on Shock Wave-Vortex Ring Interaction by the Micro Vortex Generator Controlled Ramp Flow with Turbulent Inflow, Aerospace Science  and Technology Vol 30, 2013, pp 226–231, with Caixia Chen, Ping Lu and Chaoqun Liu.

47. Shear Layer Stability Analysis in Boundary Layer Transition and MVG controlled Ramp Flow. AIAA paper, 2013 -053, with Chaoqun Liu.. 48. Origin of Ring-like Vortices in the MVG Controlled Ramp Flow. AIAA paper, 2013-0400, with Chaoqun Liu. 49. Further Investigation on Shock Wave -Vortex Ring Interaction by the MVG Controlled Ramp Flow with Turbulent Inflow. AIAA paper, 2013- 0401, with Chaoqun Liu.

50. DNS Study on Lambda Vortex and Vortex Ring Formation by Vortex Filaments in Flow Transition. AIAA paper, 2013-0996, with Caixia Chen,  Huankun Fu and Chaoqun Liu,

51. The Vortical Structures in the Rear Separation and Wake Produced by a Supersonic Micro-Ramp. AIAA paper, 2013-0248, with Chaoqun Liu,  Zhengzhong Sun and Xiao Wang.

52. Numerical and Experimental Investigations of the Flow behind a Supersonic Micro-Ramp, AIAA paper, 2013-0954, with Zhengzhong Sun,  Fulvio Scarano, Bas Van Oudheusden,Ferry Schrijer, Xiao Wang and Chaoqun Liu,

53. Numerical Discovery and Experimental Confirmation of Vortex Ring Generation by Microramp Vortex Generator. Applied Mathematical  Modelling, Vol 36(11), 2012, pp 5700–5708, with Qin li, Chaoqun Liu, Adam Pierce, and Frank Lu.

54. On the wave breaking phenomena for the generalized periodic two-component Dullin-Gottuald-Holm System. Mathematics and Computers in  Simulation. J. Math. Phys. Vol 53, 2012, 103709, with Caixia Chen.

55. Numerical Investigation on Mechanism of Multiple Vortex Rings Formation in Late Boundary-Layer Transition, Computers & Fluids, Vol  71(30), 2013, pp 156-168, with Ping Lu and Chaoqun Liu.

56. LES Study on Shock wave-Vortex Ring Interaction by the MVG Controlled Ramp Flow with turbulence inlet from DNS. AIAA paper 2012- 0047, with Caixia Chen, Ping Lu and Chaoqun Liu.

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60. DNS Study on Turbulence Generation and Sustenance in Late Boundary Layer Transition. ICCFD7-2301 (7th International Conference on Computational Fluid Dynamics ) , 2012, with Chaoqun Liu, Ping Lu and Manoj Thapa.

61. New Theories on Boundary Layer Transition and Turbulence Formation”. Modelling and Simulation in Engineering, Vol 2012, 2012, Article ID  619419, with Chaoqun Liu, Ping Lu and Lin Chen.

62. Numerical, Experimental and Theoretical Studies on Mechanism of K-H Instability and Ring Generation behind Supersonic MVG. AIAA paper  2011-676, with Qin Li and Chaoqun Liu.

63. Numerical and Experimental Studies on the Separation Topology of the MVG Controlled Flow. AIAA paper 2011-72, with Qin Li and Chaoqun  Liu.

64. The Interaction between Vortex Rings and Oblique Shocks by the MVG Controlled Ramp Flow at M=2.5. AIAA paper 2011-861, with Qin Li  and Chaoqun Liu.

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68. Numerical simulation of a drop impact on liquid film using LBM. Journal of shanghai university. Vol 14(4), 2008, pp 399-404, with Shi ziyan, Yang fanand Hongxun Chen.

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