LIN FU

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BACKGROUND (link)

Researchgate: https://www.researchgate.net/profile/Lin_Fu7
Google scholar: https://scholar.google.com/citations?user=JkACgHAAAAAJ&hl=en
Homepage: https://profiles.stanford.edu/lin-fu
ORCiD: https://orcid.org/0000-0001-8979-8415
Personal website: https://sites.google.com/view/linfu/home

ACADEMIC CAREER (link)

Center for Turbulence Research, Stanford University *Jan. 2018 -*
CTR Postdoctoral fellow
Mentor: Prof. Parviz Moin

Center for Turbulence Research, Stanford University *Jun. 24 - Jul. 20, 2018*
CTR Summer Program 2018

Department of Mechanical Engineering, Technical University of Munich *Sep. 2017 - Dec. 2017*
Postdoctoral fellow
Mentor: Prof. Nikolaus A. Adams

EDUCATION

Technical University of Munich, Germany *2013-2017*
Ph.D., Fluid Mechanics
Grade: **summa cum laude (passed with highest distinction)**
Supervisor: Prof. Nikolaus A. Adams and PD Dr.-Ing. habil. Xiangyu Hu

Northwestern Polytechnical University, P.R. China *2010-2013*
Master of Science, Fluid Mechanics
Grade: 90.15%
Supervisor: Prof. Zhenghong Gao

Northwestern Polytechnical University, P.R. China *2006-2010*
Bachelor of Science, Aerospace Engineering
Grade: 90.2% (Top 2/300)

RESEARCH TOPICS (link)

Data science

- Artificial intelligence and machine learning techniques for improving turbulence modeling.
- Machine learning techniques for solving PDEs.

Turbulence and modeling

- Incompressible and compressible wall-bounded turbulence.
- Isotropic turbulence and shock-turbulence interaction.
- Subgrid-scale (SGS) model.
- Wall-modeled large-eddy simulation.
- Shock-boundary-layer interaction.
- Shock-induced transition.
- Flow stability.

High-order numerical methods for conservation laws

- Novel high-order TENO schemes (targeted ENO) for hyperbolic conservation laws.
  TENO family schemes have been reported in the popular CFD textbook, computational methods for fluid dynamics.
- Novel implicit large eddy simulation (ILES) model for incompressible and compressible turbulence.
- Low-dissipation low-dispersion optimal finite-difference schemes.
- New TENO based shock-capturing framework.
- Implicit time-marching method for stiff ODEs and PDEs

RANS methodology for compressible aerodynamics

- State-of-the-art RANS based turbulence models for engineering problems, e.g. DES, DDES and WM-LES.
- High-resolution numerical methods, e.g. low-dissipation Riemann solvers and high-order reconstruction schemes.
- CPU and GPU based parallel multi-block flow solvers for aerodynamic simulations with realistic geometries and realistic Reynolds numbers.

Multi-phase flows

- Bubble dynamics, droplet dynamics and shock-bubble/droplet interactions.
- Bubble/droplet laden turbulence.
- Compressible multi-phase flow simulations based on conservative sharp interface method.
- Multi-scale and multi-resolution simulations of multi-phase flows.
- Low-dissipation numerical framework for level-set based interface-capturing methods.

Smoothed-particle hydrodynamics (SPH) method

- Interfacial flows, multi-phase and multi-physics flow simulations with SPH.
- Robust numerical discretization algorithms for SPH method.
- Large-scale parallel framework for SPH method.

High performance computing

- Exascale-oriented high performance computing for fundamental turbulent flows.
- Open-source exascale parallel flow solvers for hypersonic flows.
- Novel physics-driven SPH based partitioning method for Adaptive Mesh Refinement (AMR) mesh.
- Novel Centroidal Voronoi Particle (CVP) based domain decomposition method.

Unstructured mesh generation

· Novel SPH/CVP based isotropic and anisotropic unstructured mesh generation.
· 2D/3D unstructured mesh generation for general scientific computing.
· Large-scale parallel mesh generation for realistic geometries.

RESEARCH PROJECTS/GRANTS

Transitional shock-wave/boundary-layer interactions in hypersonic flow *Jan. 2018-*

· Funded by U.S. Air Force Office of Scientific Research (AFOSR), Grant NO. 1194592-1-TAAHO.
· Mentor: Prof. Parviz Moin.
· Conduct the extreme large-scale **Direct Numerical Simulations (DNS)** and **Wall-Modeled Large Eddy Simulations (WMLES)** with **200K CPU cores** and **200M CPU hours** to study the physical process of flow transition, separation, turbulence, and aerodynamic heating.

High-performance computing of near-wall turbulence with large-eddy simulation *Jan. 2018-*

· Funded by U.S. Department of Energy INCITE program.
· Mentor: Prof. Parviz Moin.
· Site: Argonne National Laboratory
· Machine (Allocation): IBM Blue Gene/Q (24,000,000 node-hours)
· Demonstrate the predictive capability of low-dissipation LES methodologies for near-wall turbulence, and develop high-performance parallel flow solvers based on WMLES.

Hypersonic flows over the double-fin geometry *Oct. 2019-*

· Funded by The Boeing Company.
· Mentor: Prof. Parviz Moin.
· Investigate the hypersonic flows over the double-fin geometry, and predict the flow separation, the mean heat flux and the pressure field with the state-of-the-art WMLES methodology.

PUBLICATIONS (link)

Ph.D. thesis

· **Lin Fu**, Ph.D thesis, Numerical methods for computational fluid dynamics - a new ENO paradigm and a new domain decomposition method, Technical University of Munich, Germany, Oct. 2nd, 2017, **summa cum laude (passed with highest distinction)**.

Patent

1 Method and system for generating a mesh, Xiangyu Hu, **Lin Fu (the first author as a Ph.D. student and the major contributor)**, Luhui Han, Nikolaus Adams, ***EP3255611 (Europe), US20190304180A1 (USA)***, Dec. 13, 2017.

In preparation/under-reviewing

5 Takagi, Shinichi; **Fu, Lin (corresponding-author)**; Xiao, Feng; "A novel high-order low-dissipation TENO/THINC scheme for hyperbolic conservation laws," *In preparation for Journal of Computational Physics 2020.*

4 Griffin, Kevin Patrick; **Fu, Lin**; Moin, Parviz; "A general method for determining the boundary layer thickness in non-equilibrium flows," *Submitted to Physical Review Fluids 2020.*

3 Griffin, Kevin Patrick; **Fu, Lin**; "A new ODE-based wall model for boundary layers accounting for pressure gradient and Reynolds number effects," *Submitted to Physical Review Fluids 2020*, arXiv:2010.04097.

2 Li, Yue; **Fu, Lin**; Adams, Nikolaus; "High-order TENO scheme with machine learning technique for solving hyperbolic conservation laws," *In preparation for Journal of Computational Physics 2020.*

1 **Fu, Lin**; Bose, Sanjeeb; Moin, Parviz; "Heat transfer in three-dimensional intersecting shock-wave/turbulent boundary-layer interactions with wall-modeled large-eddy simulations," *Submitted to Theoretical and Computational Fluid Dynamics 2020*, arXiv:2009.02411.

Journal papers

(*J. Fluid Mech.* ***1****, J. Comput. Phys.* ***7****, Comput. Methods. Appl. Mech. Eng.* ***4****, Comput. Phys. Commun.* ***6****, Commun. Comput. Phys.* ***4****, J. Sci. Comput.* ***1****, Comput. Fluids* ***1****, AIAA J.* ***1****, Eng. Comput.* ***1***)

29 Ji, Zhe; **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "A Feature-aware SPH for Isotropic Unstructured Mesh Generation," *Computer Methods in Applied Mechanics and Engineering*, 375 (2021) 113634.

28 Li, Yue; **Fu, Lin (corresponding-author)**; Adams, Nikolaus; "A low-dissipation shock-capturing framework with flexible nonlinear dissipation control," *Journal of Computational Physics*, 428 (2021) 109960.

27 **Fu, Lin**; Karp, Michael; Bose, Sanjeeb; Moin, Parviz; Urzay, Javier; "Shock-induced heating and transition to turbulence in a hypersonic boundary layer," *Journal of Fluid Mechanics*, 909 (2021) A8.

26 Bassenne, Maxime; **Fu, Lin**; Mani, Ali; "Time-Accurate and highly-Stable Explicit operators for stiff problems," *Journal of Computational Physics*, 424(2021)109847.

25 Renzo, Mario Di; **Fu, Lin**; Urzay, Javier; HTR solver: An open-source exascale-oriented task-based multi-GPU high-order code for hypersonic aerothermodynamics, *Computer Physics Communications*, 255(2020): 107262.

24 Ji, Zhe; **Fu, Lin (co-first-author)**; Hu, Xiangyu; Adams, Nikolaus; A Consistent Parallel Isotropic Unstructured Mesh Generation Method based on Multi-phase SPH, *Computer Methods in Applied Mechanics and Engineering*, 363C (2020) 112881.

23 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; Adaptive anisotropic unstructured mesh generation method based on fluid relaxation analogy, *Communications in Computational Physics*, 27 (2020), pp. 1275-1308.

22 **Fu, Lin**; A very-high-order TENO scheme for all-speed gas dynamics and turbulence, *Computer Physics Communications*, Volume 244, November 2019, Pages 117-131.

21 **Fu, Lin**; Tang, Qi; High-order low-dissipation targeted ENO schemes for ideal magnetohydrodynamics, *Journal of Scientific Computing*, (2019)80: 692-716.

20 **Fu, Lin**; Han, Luhui; Hu, Xiangyu; Adams, Nikolaus; An isotropic unstructured mesh generation method based on a fluid relaxation analogy, *Computer Methods in Applied Mechanics and Engineering*, 350 (2019) pp. 396-431.

19 Ji, Zhe; **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; A Lagrangian Inertial Centroidal Voronoi Particle method for dynamic load balancing in particle-based simulations, *Computer Physics Communications*, Volume 239, June 2019, Pages 53-63.

18 **Fu, Lin**; A hybrid method with TENO based discontinuity indicator for hyperbolic conservation laws, *Communications in Computational Physics*, 26 (2019), pp. 973-1007.

17 **Fu, Lin**; Ji, Zhe; Hu, Xiangyu; Adams, Nikolaus; Parallel fast-neighbor-searching and communication strategy for particle-based methods, *Engineering Computations*, Vol. 36 (2019) Issue: 3, pp.899-929.

16 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; Improved Five- and Six-Point Targeted Essentially Nonoscillatory Schemes with Adaptive Dissipation, *AIAA Journal*, Vol. 57, No. 3 (2019), pp. 1143-1158.

15 **Fu, Lin**; A low-dissipation finite-volume method based on a new TENO shock-capturing scheme, *Computer Physics Communications*, Volume 235, February 2019, Pages 25-39.

14 Ji, Zhe; **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; A new multi-resolution parallel framework for SPH, *Computer Methods in Applied Mechanics and Engineering*, 346 (2019) 1156-1178.

13 **Fu, Lin**; Ji, Zhe; An optimal particle setup method with Centroidal Voronoi Particle dynamics, *Computer Physics Communications*, Volume 234, January 2019, Pages 72-92.

12 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; A new class of adaptive high-order targeted ENO schemes for hyperbolic conservation laws, *Journal of Computational Physics*, Volume 374, 1 December 2018, Pages 724-751.

11 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; A targeted ENO scheme as implicit model for turbulent and genuine subgrid scales, *Communications in Computational Physics*, 26 (2019), pp. 311-345.

10 Dong, Haibo; **Fu, Lin**; Zhang, Fan; Liu, Yu; Liu, Jun; Detonation simulations with a fifth-order TENO scheme, *Communications in Computational Physics*, 25 (2019), pp. 1357-1393.

9 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; Single-step reinitialization and extending algorithms for level-set based multi-phase flow simulations, *Computer Physics Communications*, Volume 221, December 2017, Pages 63-80.

8 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; Targeted ENO schemes with tailored resolution property for hyperbolic conservation laws, *Journal of Computational Physics*, Volume 349, 15 November 2017, Pages 97-121.

7 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; A physics-motivated Centroidal Voronoi Particle domain decomposition method, *Journal of Computational Physics*, Volume 335, 15 April 2017, Pages 718-735.

6 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; A novel partitioning method for block-structured adaptive meshes, *Journal of Computational Physics*, Volume 341, 15 July 2017, Pages 447-473.

5 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; A family of high-order targeted ENO schemes for compressible-fluid simulations, *Journal of Computational Physics* 305 (2016): 333-359.

4 **Fu, Lin**; Gao, Zhenghong; Xu, Kan; Xu, Fang; A multi-block viscous flow solver based on GPU parallel methodology, *Computers and Fluids* 95 (2014): 19-39.

3 **Fu, Lin**; Gao, Zhenghong; Zuo, Yingtao; Application on MLP high order reconstruction scheme, *Journal of Aerospace Power*, vol. 29, no. 10, pp. 23212330, 2014.

2 **Fu, Lin**; Gao, Zhenghong; Zuo, Yingtao; High order WENO scheme based on HLL-HLLC solver and its application, *Chinese Journal of Computational Mechanics*, vol. 31, no. 1, pp. 128-134, 2014.

1 **Fu, Lin**; Gao, Zhenghong; Zhang, Xiaodong; Construction and application research of HLL-HLLC scheme, *Acta Aerodynamica Sinica*, vol. 32, no. 1, pp.116-122, 2014.

Archival publications

5 Griffin, Kevin Patrick; **Fu, Lin**; Moin, Parviz; "Incorporating non-equilibrium effects in an ODE-based wall model," *Ann. Res. Briefs 2020*, Center for Turbulence Research, Stanford University.

4 **Fu, Lin**; Bose, Sanjeeb; Moin, Parviz; "Wall-modeled LES of three-dimensional intersecting shock wave/turbulent boundary-layer interactions," *Ann. Res. Briefs 2020*, Center for Turbulence Research, Stanford University.

3 **Fu, Lin**; Karp, Michael; Bose, Sanjeeb; Moin, Parviz; Urzay, Javier; "Turbulence statistics in a high Mach number boundary layer downstream of an incident shock wave," *Ann. Res. Briefs 2019*, Center for Turbulence Research, Stanford University.

2 **Fu, Lin**; Karp, Michael; Bose, Sanjeeb; Moin, Parviz; Urzay, Javier; "Equilibrium wall-modeled LES of shock-induced aerodynamic heating in hypersonic boundary layers," *Ann. Res. Briefs 2018*, Center for Turbulence Research, Stanford University.

1 Gao, Xiangyu; Buchmeier, Jonas; Bermejo-Moreno, Ivan; Larsson, Johan; **Fu, Lin**; Lele, Sanjiva; "S-calar mixing under shock/turbulence interaction: DNS, statistical and geometric analyses," *Proceedings of the Summer Program 2018*, Center for Turbulence Research, Stanford University.

Conference papers

29 Li, Yue; **Fu, Lin**; Adams, Nikolaus; A low-dissipation shock-capturing framework with flexible nonlinear dissipation control, ECCOMAS CONGRESS 2020 & 14th World Congress of Computational Mechanics (Virtual), Jan. 11 to 15, 2021.

28 Takagi, Shinichi; Wakimura, Hiro; **Fu, Lin**; Xiao, Feng; A new TENO/THINC hybrid high-resolution scheme for shock capturing,The 34th Japanese symposium on computational fluid dynamics, Dec. 21-23, 2020 (Online).

27 Li, Yue; **Fu, Lin**; Adams, Nikolaus; A low-dissipation shock-capturing framework with flexible nonlinear dissipation control, Bulletin of the American Physical Society (APS), 73rd Annual Meeting of the APS Division of Fluid Dynamics (Virtual), November 22-24, 2020; Chicago, IL.

26 Griffin, Kevin Patrick; **Fu, Lin**; Moin, Parviz; A new ODE-based wall model for boundary layers accounting for pressure gradient and Re effects, Bulletin of the American Physical Society (APS), 73rd Annual Meeting of the APS Division of Fluid Dynamics (Virtual), November 22-24, 2020; Chicago, IL.

25 **Fu, Lin**; Bose, Sanjeeb; Moin, Parviz; Large eddy simulation of intersection shock-wave/turbulent boundary layer interactions in hypersonic flow regimes, Bulletin of the American Physical Society (APS), 73rd Annual Meeting of the APS Division of Fluid Dynamics (Virtual), November 22-24, 2020; Chicago, IL.

24 **Fu, Lin**; Moin, Parviz; 2020 AFOSR/ONR/HVSI Hypersonic Aerodynamics Portfolios Review, virtually, USA, July 27-31, 2020.

23 **Fu, Lin**; Karp, Michael; Bose, Sanjeeb; Moin, Parviz; Urzay, Javier; Shock-induced transition and heating in hypersonic boundary layers, The Thermal & Fluid Sciences Affiliates and Sponsors Conference, at Stanford University on February 4-5, 2020.

22 **Fu, Lin**; Karp, Michael; Bose, Sanjeeb; Moin, Parviz; Urzay, Javier; Shock-induced transition and heating in hypersonic boundary layers, Bulletin of the American Physical Society (APS), 72nd Annual Meeting of the APS Division of Fluid Dynamics, Saturday–Tuesday, November 2326, 2019; Seattle, Washington.

21 **Fu, Lin**; Moin, Parviz; 2019 AFOSR/ONR/HVSI Hypersonic Aerothermodynamics Portfolios Review, University of Colorado, Aerospace Engineering Sciences Building, 3775 Discovery Drive, University of Colorado Boulder, Boulder, CO 80309, USA, July 8-12, 2019.

20 Ji, Zhe; **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "A Consistent Parallel Isotropic Unstructured Mesh Generation Method Based on a Fluid Relaxation Analogy," ICCFD 2019 : International Conference on Computational Fluid Dynamics, Amsterdam, The Netherlands, May 14 - 15, 2019.

19 **Fu, Lin**; "Reviewing of High-order TENO Schemes for Hyperbolic Conservation Laws," SIAM Conference on Computational Science and Engineering, Feb. 24, 2019 - Mar. 01, 2019, Spokane, Washington USA.

18 **Fu, Lin**; Bose, Sanjeeb; Urzay, Javier; Moin, Parviz; " WMLES of shock-induced aerodynamic heating in hypersonic boundary layers," The Thermal & Fluid Sciences Affiliates Program (TFSA), February 5-6, 2019, Stanford University, USA.

17 Buchmeier, Jonas; Gao, Xiangyu; Bermejo-Moreno, Ivan; Larsson, Johan; Lele, Sanjiva; **Fu, Lin**; " Time-evolution of passive scalar structures in shock-turbulence interaction," The 71st Annual Meeting of the American Physical Societys Division of Fluid Dynamics (DFD), November 18-20, 2018, the Georgia World Congress Center in Atlanta, Georgia, USA.

16 Gao, Xiangyu; Bermejo-Moreno, Ivan; Larsson, Johan; **Fu, Lin**; Lele, Sanjiva; " Flow Topology and Alignment Analysis of Passive Scalar Mixing in Shock Turbulence Interaction," The 71st Annual Meeting of the American Physical Societys Division of Fluid Dynamics (DFD), November 18-20, 2018, the Georgia World Congress Center in Atlanta, Georgia, USA.

15 **Fu, Lin**; Cho, Minjeong; Bose, Sanjeeb; Urzay, Javier; Moin, Parviz; " Equilibrium wall-modeled LES of shock-induced aerodynamic heating in hypersonic boundary layers," The 71st Annual Meeting of the American Physical Societys Division of Fluid Dynamics (DFD), November 18-20, 2018, the Georgia World Congress Center in Atlanta, Georgia, USA.

14 **Fu, Lin**; Advances in PDEs: Theory, Computation and Application to CFD, August 20 - August 24, 2018, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, USA.

13 **Fu, Lin**; Adams, Nikolaus; " High-order Targeted ENO Scheme for Turbulence Simulations," The 13th World Congress in Computational Mechanics, July 22, 2018 - July 27, 2018, New York, USA.

12 Ji, Zhe; **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; " A Lagrangian inertial centroidal Voronoi particle method for dynamic load balancing in particle-based simulations," 13th SPHERIC International Workshop, 26-28 June 2018, Galway, Ireland.

11 **Fu, Lin**; "Novel high order TENO schemes and new domain decomposition method," The 2nd NPU Aoxiang Forum for Distinguished Young Scholars, November 15th to 20th, 2017, Xi'an, China.

10 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "Implicit Large Eddy Simulations with a high-order TENO scheme," Tenth International Symposium on Turbulence and Shear Flow Phenomena (TSFP10), July 6-9, 2017, Swissotel, Chicago-IL, USA.

9 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "An unstructured-mesh generator based on SPH analogy," The 17th Platform for Advanced Scientific Computing (PASC) Conference (PASC17), June 26 to 28, 2017, at Università della Svizzera italiana (USI), Lugano, Switzerland.

8 Ji, Zhe; **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "A new parallel framework for SPH method with adaptive smoothing-length," 12th International Smoothed Particle Hydrodynamics European Research Interest Community (SPHERIC) Workshop (SPHERIC 2017), 13-15 June 2017, at the Universidade de Vigo (Ourense Campus), Spain.

7 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "A new class of adaptive high-order TENO schemes for Hyperbolic Conservation Laws," ECCOMAS Thematic Conference: European Conference on High Order Nonlinear Numerical Methods for Evolutionary PDEs: Theory and Applications, HONOM 2017, March 27 - March 31, 2017, University of Stuttgart, Germany.

6 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "A high-order TENO scheme for the large eddy simulation of incompressible and compressible turbulence," Frontiers in Applied and Computational Mathematics in honor of the 60th Birthday of Professor Chi-Wang Shu, Division of Applied Mathematics at Brown University, USA from January 4 - 6, 2017.

5 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "A physics-motivated Centroidal Voronoi Particle domain decomposition method," 11th International SPHERIC (SPHERIC 2016) Workshop at Technische Universität München (TUM) in Garching Germany, from June, 13-16, 2016.

4 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "A family of high order targeted ENO scheme for compressible fluid simulations," Ninth International Symposium On Turbulence and Shear Flow Phenomena (TSFP-9), the university of Melbourne, Australia from 30 June to 3 July, 2015.

3 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "Explicit reinitialization and extending algorithms for level-set based sharp-interface method," Ninth International Symposium On Turbulence and Shear Flow Phenomena (TSFP-9), the university of Melbourne, Australia from 30 June to 3 July, 2015.

2 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "Physics-driven approach to load balancing in massively parallel CFD," 2nd Frontiers in Computational Physics Conference: Energy Sciences, 3-5 June 2015, ETH university, Zurich, Switzerland.

1 **Fu, Lin**; Hu, Xiangyu; Adams, Nikolaus; "Numerical simulation of shock bubble interaction with a conservative sharp interface model," 2nd International Conference on Numerical Methods in Multiphase Flows (ICNMMF-II), the university of Darmstadt, Germany, from June 30 to July 2 in 2014.

INVITED TALKS

Mathematics And Computer Science Division, Argonne National Laboratory

15 **Fu, Lin**; "TENO Scheme: A New Paradigm for Hyperbolic Conservation Laws and Turbulent Flow," December 16, 2020, Mathematics And Computer Science Division, Argonne National Laboratory, U.S. Department of Energy Office of Science, 9700 S. Cass Avenue Lemont, IL 60439.

Department of Mechanical and Aerospace Engineering, Hong Kong University of Science and Technology

14 **Fu, Lin**; "Turbulence and heat transfer prediction with scale-resolving simulations," 10 November 2020, Department of Mechanical and Aerospace Engineering, Hong Kong University of Science and Technology.

Department of Mathematics, Hong Kong University of Science and Technology

13 **Fu, Lin**; "Towards the high-fidelity computation and modeling of compressible turbulent flows," 11 September 2020, Seminar on Scientific Computation, Department of Mathematics, Hong Kong University of Science and Technology.

Institute of Applied Physics and Computational Mathematics (IAPCM) & **Shanghai University**

12 **Fu, Lin**; "High-order TENO schemes for general hyperbolic conservation laws and turbulent flows," June 9th, 2020, Institute of Applied Physics and Computational Mathematics (IAPCM) & Shanghai University.

College of Engineering, Peking University

11 **Fu, Lin**; "High-fidelity computation and modeling of compressible turbulent flows," May 6th, 2020, College of Engineering, Peking University, No. 60 Yannan Yuan, 100871, China.

Aerospace Engineering Department, Iowa State University

10 **Fu, Lin**; "High-fidelity computation and modeling of compressible turbulent flows," Mar. 9th, 2020, Aerospace Engineering Department at Iowa State University 1200 Howe; 537 Bissell Road; Ames, IA 50011-1096, USA.

Department of Mechanical and Aerospace Engineering, University of California Irvine

9 **Fu, Lin**; "High-fidelity computation and modeling of compressible turbulent flows," Mar. 3rd, 2020, Department of Mechanical and Aerospace Engineering, University of California Irvine, CA 92697, USA.

Division of Applied Mathematics, Brown University

8 **Fu, Lin**; "High-fidelity computation and modeling of compressible turbulent flows," Feb. 28th 2020, Division of Applied Mathematics, Brown University, Providence, Rhode Island 02912, USA.

Department of Mechanical Engineering, The University of Texas at San Antonio

7 **Fu, Lin**; "High-fidelity computation and modeling of turbulent flows," Jan. 29th 2020, Department of Mechanical Engineering, The University of Texas at San Antonio, San Antonio, TX 78249, USA.

School of Naval Architecture, Ocean & **Civil Engineering (NAOCE), Shanghai Jiao Tong University**

6 **Fu, Lin**; "High fidelity scientific computations of complex fluids," 8:30am, Tuesday, Dec. 26th 2019, School of Naval Architecture, Ocean & Civil Engineering (NAOCE), Shanghai Jiao Tong University, Shanghai, China.

Turbulence Tea, Stanford University (link)

5 **Fu, Lin**; "DNS and WMLES for shock-induced aerodynamic heating in hypersonic boundary layers at Mach 6," TURBULENCE TEA at 4:30pm, Friday, April 5th, 2019, CTR Conference Room, Stanford University, USA.

Department of Aeronautics & **Astronautics, Stanford University**

4 **Fu, Lin**; "Recent development of the high order TENO schemes," 4:30pm, February 08th, 2018, Department of Aeronautics & Astronautics, Stanford University, USA.

Turbulence Tea, Stanford University (link)

3 **Fu, Lin**; "The high order TENO schemes: concepts, methods and performances," TURBULENCE TEA at 4:30pm, Friday, January 26th, 2018, CTR Conference Room, Stanford University, USA.

Department of aerospace engineering, Xi'an Jiaotong University (link)

2 **Fu, Lin**; "Novel high order TENO schemes and new domain decomposition method," State Key Laboratory for Mechanical Structural Strength and Vibration (SVL), Xi'an Jiaotong University, November 15th, 2017, Xi'an, China.

Department of aerospace engineering, Northwestern Polytechnical University

1 **Fu, Lin**; "Novel high order TENO schemes and new domain decomposition method," The 2nd NPU Aoxiang Forum for Distinguished Young Scholars, November 15th to 20th, 2017, Department of aerospace engineering, Northwestern Polytechnical University, Xian, China.

OPEN-SOURCE SOFTWARE BASED ON THE TENO SCHEME

OpenSBLI solver
Based on TENO5, TENO6 and TENO8

· A framework for the automated derivation and parallel execution of finite difference solvers on a range of computer architectures.
· Lusher, David J., Satya P. Jammy, and Neil D. Sandham. "OpenSBLI: Automated code-generation for heterogeneous computing architectures applied to compressible fluid dynamics on structured grids." arXiv preprint arXiv:2007.14933 (2020).
· Code repository, (link)

HTR solver
Based on TENO6-A

· An open-source exascale-oriented task-based multi-GPU high-order code for hypersonic aerothermodynamics
· Renzo, Mario Di; **Fu, Lin**; Urzay, Javier; "HTR solver: An open-source exascale-oriented task-based multi-GPU high-order code for hypersonic aerothermodynamics," *Computer Physics Communications*, (2020): 107262.
· Code repository, (link)

ALPACA solver
Based on TENO5

· A MPI-parallelized C++ code framework to simulate compressible multiphase flow physics
· Hoppe, Nils; Adami, Stefan; Adams, Nikolaus A. ; "A modular massively parallel computing environment for three-dimensional multiresolution simulations of compressible flows," *arXiv:2012.04385*, (2020).
· Code repository, (link)

OUTREACH, SERVICE, AND WORKSHOP ORGANIZATION

Reviewing

· *Journal of Computational Physics (JCP), Computer Methods in Applied Mechanics and Engineering (CMAME), Journal of Scientific Computing (JSC), Physics of Fluids (POF), Computers & Fluids (C&F), International Journal for Numerical Methods in Fluids, Advances in Computational Mathematics, Communications in Computational Physics (CICP), Aerospace Science and Technology, Engineering Computations, Computer Physics Communications (CPC), International Journal of Heat and*

Fluid Flow, Numerical Methods for Partial Differential Equations, International Journal of Computational Fluid Dynamics, AIAA Journal, Shock Waves, Nonlinear Dynamics, Applied Ocean Research, Engineering Analysis with Boundary Elements, Energies, CTR Summer Program (2018, 2020).

Membership

- *American Physical Society (APS).*
- *Society for Industrial and Applied Mathematics (SIAM).*

Minisymposia Organizer

- Minisymposia organizer and chair of **State-of-the-art high-order Numerical Methods and Complex Fluid Simulations**, *SIAM Conference on Computational Science and Engineering (CSE19), February 25 - March 1, 2019, Spokane Convention Center — Spokane, Washington, USA.*
- Organizer of **11th International SPHERIC (SPHERIC 2016) Workshop at Technische Universität München (TUM)** in Garching, Munich, Germany, from June, 13-16, 2016.

Collaborators

- *Prof. Nikolaus Adams (Technical University of Munich), Prof. Parviz Moin (Stanford University), Prof. Feng Xiao (Tokyo Institute of Technology), Dr. Javier Urzay (Stanford University), Dr. Qi Tang (Los Alamos National Laboratory), Dr. Maxime Bassenne (Stanford University), Dr. Mario Di Renzo (Stanford University), Dr. Sanjeeb Bose (Stanford University, Cascade Technologies), Dr. Michael Karp (Stanford University), Carlos Gonzalez (Stanford University), Kevin Griffin (Stanford University), Zhe Ji (Technical University of Munich), Yue Li (Technical University of Munich)*

TEACHING, MENTORING AND CO-DIRECTION EXPERIENCE

Computational Solid and Fluid Dynamics

- **Teaching Assistant / Grader** in Technical University of Munich (*09.2013-09.2017)*

ODE-based wall model for boundary layers

- **Ph.D. Thesis** of *M.Sc. Kevin Patrick Griffin* in Stanford University (*09.2018-*)
- Co-supervised with **Prof. Parviz Moin**

Flow Control and Shock Wave Boundary Layer Interaction

- **Ph.D. Thesis** of *M.Sc. Yue Li* in Technical University of Munich (*09.2017-*)
- Co-supervised with **Prof. Dr.-Ing. Nikolaus Adams**

High-performance Computing (HPC), SPH Method and Mesh Generation Method

- **Ph.D. Thesis** of *M.Sc. Zhe Ji* in Technical University of Munich (*09.2015-*)
- with **Prof. Dr.-Ing. Nikolaus Adams**

HONORS & AWARDS

Outstanding reviewer

- Journal of Computational Physics (*2017, 2018)*

Mathematical workshop travelling award

- ICERM of Brown University (*2018)*

CTR Postdoctoral fellowship

· Stanford University (*2018-2021*)

Ph.D. thesis award of summa cum laude (passed with highest distinction)

· Technical University of Munich (*2017*)

China Scholarship Council (CSC) scholarship

· China Scholarship Council (NO. 201206290022) (*2013-2017*)

The third prize in the competition of Mechanics

· The Chinese Society of Theoretical and Applied Mechanics (*2008*)

National scholarship

· Chinese Ministry of Education (*2008-2009*)

First-class scholarship

· AVIC The First Aircraft Institute, China (*2008-2009*)

First-class scholarship

· China Airborne Missile Academy (*2006-2007*)

Outstanding scholarship

· Northwestern Polytechnical University (*2006-2010, 4 times*)

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