Yimin Lin

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EDUCATION

University of California, Berkeley, Berkeley, CA — GPA:3.9
Bachelor of Arts, Mathematics, Dec 2018
Bachelor of Arts, Computer Science, Dec 2018

Rice University, Houston, TX — GPA:3.9
Master of Arts, Computational and Applied Mathematics, Sep 2020
Doctor of Philosophy, Computational and Applied Mathematics, Expected Dec 2023

RESEARCH INTERESTS

Computational Fluid Dynamics, Numerical Partial Differential Equations, Numerical Linear Algebra, Computational Mechanics, Computational Geometry, Computer Graphics, Numerical Analysis.

RESEARCH EXPERIENCE

Adaptive filtering strategy for Modal Entropy Stable Discontinuous Galerkin (ESDG) Methods - *Rice University* May 2022 - Present
Developing an entropy stable reduced order model based on high order entropy stable DG discretizations and projection-based hyper-reduction. A paper in preparation.

Entropy stable reduced order modeling of nonlinear conservation laws - *Rice University* Jan 2022 - Present
Developing an entropy stable reduced order model based on high order entropy stable DG discretizations and projection-based hyper-reduction. A paper in preparation.

Spectral Element Methods for Molten Salt Reactors - *Argonne National Laboratory* Jun 2021 - Present
Developing a spectral element discretization for the incompressible Navier-Stoke equations coupled with the Nernst-Planck equations. Performing large scale simulations of molten salt reactors with software Nek5000/NekCEM. A paper in preparation.

Positivity Limiting for Nodal ESDG Methods - *Rice University* Nov 2020 - Dec 2021
Developed a positivity limiting approach for nodal ESDG methods using graph viscosity terms and elementwise limiting. A paper in revision.

ESDG Methods for Compressible Flows - *Rice University* Sep 2020 - Jan 2021
Developed a modal entropy stable DG formulation for compressible Navier-Stokes equations. Performed various numerical experiments verifying the robustness and accuracy of the proposed method. A paper was published.

Entropy Stable DG-Fourier Methods - *Rice University* Sep 2019 - Sep 2020
Developed a provably entropy stable DG-Fourier method on wedges through a tensor product formulation. Achieved further computational efficiency through a GPU implementation in Julia. A paper in preparation.

Mathematical Synergy Analysis - *UC Berkeley* Sep 2017 - Dec 2018
Worked in Prof. Sachs' group on mathematical synergy analysis applying to radiation research. Applied statistical methods such as Monte Carlo simulation and numerical schemes for solving ODE. Two papers were published.

EXPERIENCE

Research Intern - *Toyota Research Institute* May 2022 - Aug 2022
Research intern in Dynamics and Simulation group at Toyota Research Institute.

Givens Associate - *Argonne National Laboratory* Jun 2021 - Present

Research assistant in Department of Mathematics and Computer Science at Argonne National Lab. Mentored by Misun Min and Paul Fischer.

Reader - *Rice University* Aug 2019 - Present
Grader for CAAM 336: Differential Equations in Science and Engineering, CAAM 519: Computational Science I, CAAM 523: Partial Differential Equations.

Tutor - *SY Academy* Aug 2017 - May 2019
Part-time tutoring for college students. Topics include Calculus, Linear Algebra, Discrete Mathematics and C++.

Course Reader, Lab Assistant - *UC Berkeley* Jan 2015 - Dec 2018
Grader for Math 104: Introduction to Analysis. Lab assistant for CS 61A: structure and interpretation of computer programs and CS 61B: Data Structures.

AWARDS

COSPAR Outstanding Paper Awards for Young Scientists Feb, 2022
SIAM TXLA section Travel Awards Oct, 2021
USNCCM16 Conference Award Apr, 2021
Best Poster Award - *SIAM CSE21* Mar, 2021
SIAM Student Travel Awards - *SIAM CSE21* Feb, 2021
Dorothea Klumpke Roberts Prize - *UC Berkeley* Dec, 2018
Awarded to a senior or seniors who have demonstrated truly exceptional scholarship in mathematics

PUBLICATIONS

[1] *A positivity preserving strategy for entropy stable discontinuous Galerkin discretizations of the compressible Euler and Navier-Stokes equations*, with J.Chan, I.Tomas, submitted to Journal of Computational Physics.

[2] *Entropy stable modal discontinuous Galerkin schemes and wall boundary conditions for the compressible Navier-Stokes equations*, with J.Chan, T.Warburton, Journal of Computational Physics.

[3] *Entropy Stable Discontinuous Galerkin-Fourier methods*, Master thesis.

[4] *Simulating galactic cosmic ray effects: synergy modeling of murine tumor prevalence after exposure to two one-ion beams in rapid sequence*, with EG.Huang, R.Huang, L.Xie, P.Chang, G.Yao, B.Zhang, DW.Ham, EA.Blakely, RK.Sachs, Life Sciences in Space Research.

[5] *Synergy theory for murine Harderian gland tumors after irradiation by mixtures of high-energy ionized atomic nuclei*, with EG.Huang, M.Ebert, DW.Ham, Y.Zhang, RK.Sachs, Radiation and environmental biophysics.

TALKS

[1] *A Positivity Preserving Strategy for Entropy Stable discontinuous Galerkin discretizations of the compressible Euler and Navier-Stokes equations*, NAHOMCon 2022, Jul 2022

[2] *Spectral Element for Coupled NS-PNP equations*, NAHOMCon 2022, Jul 2022

[3] *A Positivity Preserving Strategy for Entropy Stable discontinuous Galerkin discretizations of the compressible Euler and Navier-Stokes equations*, AMS spring sectional meeting, Mar 2022

[4] *A Positivity Preserving Strategy for Entropy Stable discontinuous Galerkin discretizations of the compressible Euler and Navier-Stokes equations*, FEM Rodeo, Mar 2022

[5] *A Positivity Preserving Strategy for Entropy Stable discontinuous Galerkin discretizations of the compressible Euler and Navier-Stokes equations*, SIAM TXLA, Nov 2021

[6] *Developing Spectral Element Methods for Molten Salt Reactors and a Positivity Limiting Strategy for Entropy Stable Discontinuous Galerkin Method of the Compressible Flow*, Rice CAAM seminar, Oct 2021

[7] *Developing Spectral Element Methods for Molten Salt Reactors*, ANL SASSy, Aug 2021

[8] *Entropy Stable Schemes for the Compressible Navier-Stokes Equations: Boundary conditions and Positivity Preserving Schemes*, USNCCM16, Jul 2021

[9] *Various Aspects of Entropy Stable Discontinuous Galerkin methods*, Rice CAAM seminar, Mar 2021

[10] *Entropy Stable Discontinuous Galerkin-Fourier Methods*, Master Thesis defense, Sep 2020

POSTERS

[1] *Entropy stable modal discontinuous Galerkin schemes and wall boundary conditions for the compressible Navier-Stokes equations*, with J.Chan, T.Warburton, poster, SIAM CSE21, Mar 2021

SOFTWARE

drake/MPM [https://github.com/yiminllin/drake/]
C++ implementation of a 3D Material Point Method solver. Implemention includes elastoplastic model and moving boundary conditions.

ESDG-PosLimit [github.com/yiminllin/ESDG-PosLimit]
Julia implementation of the positivity limiting strategy for entropy stable discontinuous Galerkin methods of the compressible Euler and Navier-Stokes equations. Implementing various limiting strategies proposed in the paper and numerical experiments in 1D and 2D.

ESDG-CNS [github.com/yiminllin/ESDG-CNS]
Julia implementation of modal Entropy Stable Discontinuous Galerkin methods solving compressible Navier-Stokes equations. Implementation in 2D with various boundary conditions.

ESDG-Fourier [github.com/yiminllin/ESDG-Fourier]
Julia implementation of Entropy Stable Discontinuous Galerkin-Fourier method. Implementation in 2D, 3D, accelerated by GPU using CUDA.jl.