

Chen Liu

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Professional experience

Jul 2021 – Present	Golomb Visiting Assistant Professor, Department of Mathematics, Purdue University, Mentor: Prof. Xiangxiong Zhang
Oct 2019 – Jul 2021	Research Geophysicist, CGG Services (U.S.) Inc.
Jul 2019 – Jun 2020	Visiting Researcher, Department of Computational and Applied Mathematics, Rice University
May 2016 – Aug 2016	Summer internship in Computation and Modeling at Shell International E&P, Inc.

Education

Rice University

May 2016 – May 2019	Ph.D. in Computational and Applied Mathematics
Aug 2014 – May 2016	M.A. in Computational and Applied Mathematics Advisor: Prof. Béatrice M. Rivi�re

Peking University

Sep 2012 – Jul 2014	M.S. in Applied Statistics Advisor: Prof. Hao Ge
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Nankai University

Sep 2008 – Jun 2012	Double Degrees, B.S. in Pharmacy and B.S. in Information and Numerical Science
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Publications and communications

Preprints and in preparation

1. **C. Liu** and X. Zhang (2022). “An invariant domain preserving explicit–implicit scheme for compressible Navier–Stokes equations.” *In preparation*.
2. **C. Liu**, Y. Gao, and X. Zhang (2022). “Structure preserving schemes for Fokker–Planck equations of irreversible processes.” *Submitted*. arXiv preprint arXiv:2210.16628.
3. **C. Liu**, R. Masri, and B. Rivi re (2022). “Convergence of a decoupled splitting scheme for the Cahn–Hilliard–Navier–Stokes system.” *Submitted*. arXiv preprint arXiv:2210.05625.
4. R. Masri, **C. Liu**, and B. Rivi re (2021). “Improved a priori error estimates for a discontinuous Galerkin pressure correction scheme for the Navier–Stokes equations.” *Submitted*. arXiv preprint arXiv:2112.03903.

Journal publications

1. R. Masri, **C. Liu**, and B. Rivi re (2022). “A discontinuous Galerkin pressure correction scheme for the incompressible Navier–Stokes equations: Stability and convergence.” *Mathematics of Computation*, 91(336), pp. 1625–1654. doi: 10.1090/mcom/3731.
2. **C. Liu**, D. Ray, C. Thiele, L. Lin, and B. Rivi re (2022). “A pressure-correction and bound-preserving discretization of the phase-field method for variable density two-phase flows.” *Journal of Computational Physics*, 449, p. 110769. doi: 10.1016/j.jcp.2021.110769.
3. D. Ray, **C. Liu**, and B. Rivi re (2021). “A discontinuous Galerkin method for a diffuse-interface model of immiscible two-phase flows with soluble surfactant.” *Computational Geosciences*, 25(5), pp. 1775–1792. doi: 10.1007/s10596-021-10073-y.

4. **C. Liu**, F. Frank, C. Thiele, F. O. Alpak, S. Berg, W. Chapman, and B. Rivière (2020). “An efficient numerical algorithm for solving viscosity contrast Cahn–Hilliard–Navier–Stokes system in porous media.” *Journal of Computational Physics*, 400, p. 108948. doi: 10.1016/j.jcp.2019.108948.
5. **C. Liu** and B. Rivière (2020). “A priori error analysis of a discontinuous Galerkin method for Cahn–Hilliard–Navier–Stokes equations.” *CSIAM Transactions on Applied Mathematics*, 1(1), pp. 104–141. doi: 10.4208/csiam-am.2020-0005.
6. **C. Liu**, F. Frank, F. O. Alpak, and B. Rivière (2019). “An interior penalty discontinuous Galerkin approach for 3D incompressible Navier–Stokes equation for permeability estimation of porous media.” *Journal of Computational Physics*, 396, pp. 669–686. doi: 10.1016/j.jcp.2019.06.052.
7. **C. Liu**, F. Frank, and B. Rivière (2019). “Numerical error analysis for non-symmetric interior penalty discontinuous Galerkin method of Cahn–Hilliard equation.” *Numerical Methods for Partial Differential Equations*, 35(4), pp. 1509–1537. doi: 10.1002/num.22362.
8. F. Frank, **C. Liu**, A. Scanziani, F. O. Alpak, and B. Rivière (2018). “An energy-based equilibrium contact angle boundary condition on jagged surfaces for phase-field methods.” *Journal of Colloid and Interface Science*, 523, pp. 282–291. doi: 10.1016/j.jcis.2018.02.075.
9. F. Frank, **C. Liu**, F. O. Alpak, S. Berg, and B. Rivière (2018). “Direct numerical simulation of flow on pore-scale images using the phase-field method.” *SPE Journal*, 23(5), pp. 1833–1850. doi: 10.2118/182607-PA.
10. F. Frank, **C. Liu**, F. O. Alpak, and B. Rivière (2018). “A finite volume/discontinuous Galerkin method for the advective Cahn–Hilliard equation with degenerate mobility on porous domains stemming from micro-CT imaging.” *Computational Geosciences*, 22(2), pp. 543–563. doi: 10.1007/s10596-017-9709-1.

Conference proceedings

1. F. Frank, **C. Liu**, F. O. Alpak, M. Araya-Polo, and B. Rivière (2017). “A discontinuous Galerkin finite element framework for the direct numerical simulation of flow on high-resolution pore-scale images.” *SPE Reservoir Simulation Conference*. Society of Petroleum Engineers. doi: 10.2118/182607-MS.

Theses

- C. Liu** (2019). “Discontinuous Galerkin methods for pore-scale multiphase flow: theoretical analysis and simulation.” PhD thesis. Rice University.
- C. Liu** (2016). “Pore-scale simulation of fluid flow using discontinuous Galerkin methods.” MA thesis. Rice University.
- C. Liu** (2014). “Coarse-grained model for studying DNA mediated allosteric phenomenon.” MA thesis. Peking University.

Talks and presentations

1. Mini-symposium talk, The 7th Annual Meeting of SIAM Central States Section. Oklahoma State University, Stillwater, OK. Oct 01, 2022.
2. Mini-symposium talk, SIAM Great Lakes Section Annual Meeting. Wayne State University, Detroit, MI. Sep 24, 2022.
3. Mini-symposium talk, AMS Spring Central Sectional Meeting. Purdue University, West Lafayette, IN. Mar 27, 2022.
4. Mini-symposium talk, SIAM Conference on Mathematical & Computational Issues in the Geosciences, Houston, TX. Mar 13, 2019.
5. Poster presentation, Oil & Gas HPC Conference, Houston. Mar 06, 2019.
6. Talk, Finite Element Rodeo, UT Austin, Austin, TX. Mar 01, 2019.

7. Mini-symposium talk, SCALA 2019: Scientific Computing Around Louisiana, Tulane University, New Orleans, LA. Feb 16, 2019.
8. Mini-symposium talk, InterPore 10th Annual Meeting and Jubilee Conference, New Orleans, LA. May 16, 2018.
9. Poster presentation, Offshore Technology Conference, Houston, TX. May 03, 2018.
10. Poster presentation, Oil & Gas HPC Conference, Houston. Mar 13, 2018.
11. Talk, Finite Element Rodeo, Louisiana State University, Baton Rouge, LA. Feb 23, 2018.
12. Mini-symposium talk, Texas Applied Mathematics and Engineering Symposium, UT Austin, Austin, TX. Sep 22, 2017.
13. Poster presentation, Oil & Gas HPC Conference, Houston. Mar 16, 2017.
14. Talk, Finite Element Rodeo, Houston University, Houston, TX. Mar 03, 2017.
15. Talk, Finite Element Rodeo, Texas A&M University, College Station, TX. Mar 05, 2016.
16. Poster presentation, Oil & Gas HPC Conference, Houston. Mar 03, 2016.

Workshops participation

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| June 13, 2022 – June 14, 2022 | Broadening Participation: 2022 Mathematical and Physical Sciences (MPS Workshop) for Young Investigators. Alexandria, VA. |
| Apr 20, 2017 – Apr 21, 2017 | Digital Rock Project Workshop on Pore-Scale Flow Simulation – Integration of Simulation, Experimentation, and Imaging Processes. Houston, TX. |

Teaching experience

Purdue University

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| Aug 2022 – Dec 2022 | Instructor for MA 30300 Differential Equations and Partial Differential Equations for Engineering and the Sciences |
| Jan 2022 – May 2022 | Instructor for MA 26600 Ordinary Differential Equations |
| Aug 2021 – Dec 2021 | Instructor for MA 26600 Ordinary Differential Equations |

Rice University

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| Jan 2018 – May 2018 | Teaching assistant for CAAM 335 Matrix Analysis |
| Aug 2016 – Dec 2016 | Teaching assistant for CAAM 335 Matrix Analysis |

Peking University

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| Feb 2014 – Jun 2014 | Teaching assistant for Clinical Trial Design and Analysis |
| Sep 2013 – Jan 2014 | Teaching assistant for Probability and Statistics (B) |

Professional service

Co-organizer of workshops and conference mini-symposiums

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| March 2022 | with Xiangxiong Zhang, <i>Special Session on Recent Progress of Efficient and Robust Schemes for Compressible Navier–Stokes Equations</i> , AMS Spring Central Sectional Meeting. Purdue University, West Lafayette, IN. |
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Referee for journals/proceedings

- Applied Mathematics and Computation
- Communications in Computational Physics
- Computers and Fluids
- Journal of Computational and Applied Mathematics

- Journal of Computational Physics
- SIAM Journal on Numerical Analysis
- SIAM Journal on Scientific Computing

Last updated: November 8, 2022